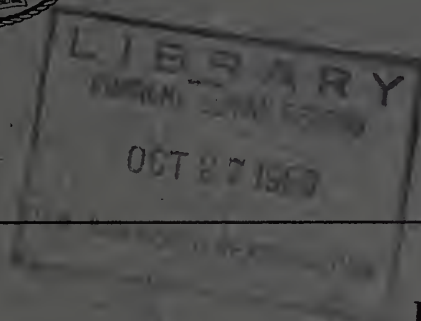


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Agricultural Economics RESEARCH



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UNITED STATES DEPARTMENT OF AGRICULTURE

• Bureau of Agricultural Economics



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AGRICULTURAL ECONOMICS RESEARCH

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Consumer Preference Research in the Department of Agriculture

By James A. Bayton

In this review of the consumer preference work that has been carried on in the Bureau, the author covers the purpose, the scope, and selected findings. The program of research provides data which can be beneficial to producers, processors, wholesalers, retailers, and consumers.

IT SEEMS SAFE to say that among those who work in the fields of social psychology and applied psychology, the research on attitudes conducted by the Bureau of Agricultural Economics is well known. This research falls into three periods. It originated late in the 1930's as an aid to administrators of the Department of Agriculture in developing programs for assisting farmers. It was thought that the work would be more effective if there was systematic understanding of attitudes of farmers toward the existing situation and the programs being tried or proposed.

The second period extended through World War II when the research was centered upon agricultural problems arising because of the wartime situation. Concurrently the facilities were made available to other Government agencies. Among the studies at that time was the attitudinal research on War Bonds and the War Bond drives. Now the research is in its third stage and is concentrated upon analysis of consumer preferences.

The three periods reflect the nature of the basic problems of their times—depression, war, and now the threat of agricultural surpluses in this country. One approach toward alleviating that possible situation is an increase in the consumption of some of the products involved. This accounts for the current emphasis on consumer preferences. Interest in this work is being continuously ex-

pressed by the advisory committees established under the Research and Marketing Act, which, incidentally, provides most of the financing for the current consumer preference studies.

One of the major features of the present program of analysis of consumer preferences is its direction toward classes of products, rather than toward specific brands within a product-class as is done in much of the commercial consumer research. This generic approach permits a much more comprehensive investigation of the product-class than is found in many consumer studies. In fact, the reactions of consumers to a brand are a part of their reactions to the entire class of which the brand is a part. Concentration upon the narrower aspects of the individual's reactions to specific objects within a class carries with it the danger of missing what could well prove to be the more important factors to be considered when trying to improve the utilization of given products. Fundamental to this approach is the aim to obtain data that will be beneficial not only to one specific group, say retailers, but that can be used by producers, processors, wholesalers, retailers, and consumers.

Within the framework of this generic approach an attempt is made to uncover the basic psychological dynamics involved in consumers' attitudes and behavior. Attention is given to learning the

meaning of the product-class to the consumers and the motivations, both positive and negative, which operate with respect to the products. Because of the generic and dynamic aspects of this research, it can perhaps be characterized as both comprehensive and intensive.

Another feature is the cooperative basis on which each project is developed. Involved in the planning of each study are specialists in the product area, as well as agricultural economists, home economists, marketing specialists, and psychologists. This permits each study to be designed in terms of the major dimensions important to it. Not all of this research is carried on by the immediate staff. In some instances, members of other Divisions within the Bureau are responsible for gathering data on phases of the problem. Some projects are contracted to private research organizations under provisions contained in the Agricultural Research and Marketing Act but they are developed on the same cooperative basis as those done in the Department.

In general, the method used in these consumer preference studies involves the use of area sampling; open-ended interviewing is used when the dynamic aspects of a problem are explored.

Specific Studies Regarding Foods

In the following description of several projects that have been conducted by the Bureau emphasis is placed upon the problems attacked and the methods used rather than upon the results of the surveys.

Dehydrated Foods.—One of the first of these consumer preference studies, made in 1944, had to do with consumer acceptance of dehydrated foods. This was part of a larger project of the Department of Agriculture and the War Food Administration relating to postwar readjustments in processing and marketing facilities and methods. An attempt was made to assess the prospects for dehydrated foods during the postwar years, a step deemed vital to the industry because of the tremendous expansion in production of these foods during the war. The consumer study was one part of an analysis of the entire industry—including productive capacity of plants, difficulties in marketing and transportation, commercial sales, and institutional usage (1).¹

Because housewives generally were not familiar with dehydrated foods a survey was conducted in Chicago in which several of these products were given to a sample of households. The survey was designed to answer the following questions. (1) Will housewives be willing to buy dehydrated foods if they are made available? (2) Which dehydrated foods are most likely to be bought? (3) How do housewives think they compare in taste with fresh and canned foods? (4) What advantages and disadvantages do housewives find in their use? (5) Do housewives think dehydrated foods differ in nutritional value from fresh and canned foods?

In a sample of 431 Chicago households (selected by area sampling) each housewife was given three of the following dehydrated foods: dried white potatoes, riced white potatoes, sweetpotatoes, beets, carrots, cranberries, eggs, and milk. The families were given enough of each to serve more than one meal so that different recipes could be tried. On the first visit the housewife was interviewed to learn the extent of her experience with dehydrated foods and her attitudes toward them. Two weeks later each was revisited to learn her reactions to the products that had been given her.

While this study was under way, an experiment was made in Chicago to learn the effectiveness of demonstrations on willingness to buy dehydrated foods. Women from high and low socio-economic neighborhoods took part. (The samples were separate from the survey.) Experimental groups attended demonstrations by home economists; control groups did not. Both groups were given dehydrated foods to use at home and were later asked about their attitudes toward them.¹

The next year, in 1945, a survey was made in Houston, Tex., regarding consumer acceptance of dried milk (2). The situation there provided an opportunity for studying this product, divorced from the possible bias created in Chicago by giving the item to the housewives. Houston was located within the southern deficit milk-producing area and dried milk (whole and skim) was being sold in retail grocery stores. The general objectives of this study were to ascertain: (1) Extent to which housewives were aware that dried milk was available, (2) extent to which they were buying it and reasons for buying or not buying, (3) experiences these people had in using it, and (4) extent they expected to continue using the prod-

¹ Italic figures in parentheses refer to References, p. 112.

uct if fresh milk should be in plentiful supply.

The major problem in sampling rested on the fact that information was not available on the rate of buying per households in the city. Interviewers made calls at 1,500 dwelling units, in the metropolitan area, which had been selected by area sampling. All homemakers who had bought dried milk, but only a subsample of those who had not bought it, were interviewed. Households in the two samples numbered 253 buyers and 479 nonbuyers.

To supplement the information from consumers a survey was made of 60 independent retailers of dried milk to learn their experiences in selling it. In addition, a member of the marketing research staff of the Bureau interviewed the executives in charge of merchandising in the six Houston chain stores. The integration of the data from the three sources—household consumers and non-consumers, independent retailers, and chain-store executives—gave insight into the problems of marketing dried milk (3).

Potatoes.—Problems of the potato industry have become acute through the combined effect of a declining per capita consumption and an increase in production. One phase of the research directed toward these problems was a study of consumer preferences with the thought that the information obtained could aid in developing improved marketing methods. Collaborating in planning this project were the BAE, the PMA, the Bureau of Human Nutrition and Home Economics, and representatives of four State agricultural experiment stations.

Beginning in 1947 and continuing into 1948 a national survey of potato preferences was made among household consumers (5). It covered the (1) use of potatoes, potato substitutes, and processed potatoes, (2) buying potatoes for external characteristics, size, and cooking qualities, (3) buying by grades and brand-packaged potatoes, (4) cooking habits, and (5) storage problems.

The universe from which the sample was drawn was all of the private households in the United States in cities of 2,500 and over. The sample (3,306 households) was so designed that separate analysis could be made for the South and for each of three cities—Boston, Chicago, and Los Angeles. The South was selected because of differences in food habits between that area and the rest of the country. The three cities represented differences

in patterns of supply—the Boston market receives most of its potatoes from Maine; Chicago's come from nearly all of the potato-producing areas; the supply for Los Angeles comes primarily from California and Idaho. The very small towns and rural sections were excluded from the sample to eliminate those households that used home-grown potatoes. The interviewing was done during November, December, and January, when the late crop was available. This crop made up about 80 percent of that year's production of potatoes. The respondents were those persons in the sample households who had main responsibility for buying and preparing food. Excluded from the sample were those households that had boarders, or in which no meals were prepared, or in which potatoes were not used.

During 1948 another survey was designed to study potato preferences among certain commercial users—restaurants and hotels—as they buy on a larger scale and they, too, buy different types and sizes (7). The sample points were New Orleans and Cincinnati, selected because they represent different situations with respect to consumption of potatoes. For example, Cincinnati is a high-consumption area, just as New Orleans has a low consumption, and competition between potatoes and foods like rice is greater in New Orleans.

Within each city the sample was selected as follows. All establishments that were classified as public eating places were listed and from this list all hotels with public dining rooms and all chain establishments (three or more units under the same management in a city) were selected. From the remaining list a random selection was made. The New Orleans sample consisted of 10 hotels, 8 restaurant chains, and 232 independent restaurants; the sample in Cincinnati had 16 hotels, 11 chains, and 225 independents. The respondents were those persons who were responsible for buying potatoes for the establishments. Usually this was the owner or manager; in some places it was the chef or cook (sometimes the job was delegated to waiters or bartenders).

Rice.—A national survey of rice preferences among household consumers was made during a 2-week period, in October 1948. The interview covered such matters as reasons for using or not using rice, ways it is used, preferences regarding length of grain, cooking methods and cooking difficulties, preferences for white and brown rice

and opinions on nutritive value of each, size and frequency of purchases, and preferences for processed rice such as breakfast cereals. The universe sampled was all of the private households in the United States. In addition, a special sample was drawn for metropolitan Chicago to permit analysis of the problem in a large cosmopolitan center. The total sample consisted of 2,450 households.

Apples and Pears.—Another project explored consumer preferences regarding apples and pears. Taking part in planning this study were members of the Bureau, the PMA, and the Farm Credit Administration. State experiment stations and universities in areas that produce commercial apples were consulted. The National Apple Institute provided certain technical data. Items studied included purposes for which apples are bought, characteristics sought in apples and pears, uses made of the products, uses made of commercially prepared apples (canned, dried, etc.), and qualities desired in apples to be served in different ways.

The national sample was similar to the one used for rice, except that the design permitted a separate analysis for Chicago and for Philadelphia. Interviewing in the 2,573 households took place during January, February, and March 1949, at the peak of the marketing season for the 1948 apple crop.

Citrus Products.—Another series of surveys involved citrus products. The first research was a pilot study conducted in Louisville and Nelson County, Ky. (8). The primary considerations in selecting these sample points were that an urban-rural analysis was desired and that the points of study should be on direct transportation lines from the major citrus-producing areas. The sample in Louisville was drawn from all the private households within the city limits. The Nelson County universe was all private households except those in the one town that had a population exceeding 2,500. In Louisville, 497 homemakers were interviewed; in Nelson County, 538 homemakers.

This survey attempted to ascertain the characteristics of users and nonusers of citrus products, the motivations involved in either, changes in quantities used, per capita consumption, and certain merchandising preferences. Simultaneously, a study was made of samples of stores in Louisville and in Nelson County, to obtain descriptions of the fresh and processed citrus products

offered for sale, including such items as the type of product, sizes, and methods of sale.

In both the Houston survey on dried milk and the Louisville-Nelson County study on citrus products, information from samples of retail grocers in the respective localities was correlated with the data obtained from the consumers. The project to be described now represents a systematic attempt to explore the attitudes and behavior of consumers of citrus products with respect to *specific* stores. This research was done in collaboration with the Texas Agricultural and Mechanical College. It centered upon those customers of two large supermarkets in Houston who lived within the area in which the stores are located. Data collected independently in these stores were correlated with the results of the consumer survey. This work was done in May and June 1949.

The location of the two supermarkets in a relatively distinct and separate part of Houston, with practically no other grocery stores in the district, gave an unusual opportunity for research permitting the coordination of store and consumer data. The stores, which were in the major shopping center for the area, approximately 19 by 21 blocks, stand side by side. The universe from which the sample was drawn included all the estimated 5,900 private dwelling units within this district. A random sample of the blocks in the area was drawn at a sampling rate designed to yield approximately 300 homemakers who had shopped at one or both of the stores within the 2 weeks just before they were interviewed. All of the dwelling units within each sample block were visited in order to locate the customers of the stores. It should be noted that this was not a sample of the universe of customers of the stores.

The purpose of the consumer survey was to learn certain facts regarding these particular homemakers:

- (1) Purchasing patterns for citrus products and other fruits, including products bought at the two supermarkets or elsewhere.

- (2) Consumer attitudes toward citrus products, including whether homemakers view these products as a distinct class within all fruit or as items within the broad category of fruit; whether they think of citrus products as unique (in terms of food value) or as having little or no real differences.

- (3) Specific preferences, such as color of fresh grapefruit and grapefruit juice; sweetened and

unsweetened juices; packaged and loose fresh citrus products; pricing by count and by weight. Reasons for preferences were asked.

By use of the method of paired comparisons, six products (fresh oranges and grapefruit; canned orange juice, grapefruit juice, and blends; and frozen orange juice concentrate) were scaled in terms of taste preference.

(4) Decision-making in buying citrus products, including the role of advertisements, planned vs. impulse buying, and aspects of the products entering into the decision.

These data were integrated with a great deal of information gathered in the two supermarkets, thus giving a comprehensive picture of the store-consumer relationship in terms of a specific set of products and conditions.

A study was made of consumer preferences for three types of canned blends of orange and grapefruit juice, in 1949. The three were a blend of 60 percent orange juice and 40 percent grapefruit juice; of 50 percent orange juice and 50 percent grapefruit juice; of 40 percent orange juice and 60 percent grapefruit juice. This survey was conducted under contract by a private concern. The outstanding feature was the use of an experimental design with a national panel of households interviewed by a mail questionnaire. The panel was made up of 2,106 families selected to represent a cross-section of the United States. In addition, the sample permitted analysis of the data in terms of three regions into which the country was divided for the purpose—eastern, western, and southern. In each of these regions 162 families (control groups) were given three cans of citrus blend all of which contained the same proportionate mixture; that is, all three cans were either a 60–40, 50–50, or 40–60 percent mixture of orange juice and grapefruit juice. The remaining 1,620 families (experimental group) were given three cans of juice, one each of the different mixtures. The three cans were identified by a triangle, circle, or square printed on the label.

The homemakers were asked to serve the three juices to each member of the family on a Sunday morning before breakfast. Separate slips with the three markings were provided so that each glass of juice could be identified. The sequence for tasting the juices was randomized throughout the experimental and control samples. The juice was to have been kept in the refrigerator the night

before and no ice was to be added at time of serving. The reactions of all members of the household over 5 years of age were obtained. Moreover, the panel homemakers were questioned about their past use of canned citrus juices and their likes and dislikes concerning them.

Specific Studies Regarding Textiles

Another series of consumer preference studies now under way has to do with textile products and clothing. The need for such studies is similar to that which led to the research on food products.

Women's Preferences Among Textiles.—The first study had to do with women's preferences for various textile products (4). It was intended to furnish information as to what women consider desirable or undesirable about cotton and other fibers as these products appear in clothing and household textiles. Some of the phases covered were: (1) Extent to which women buy ready-made clothing (house dresses, one-piece winter dresses, etc.), (2) extent to which they buy certain items of household textiles ready-made (tablecloths, dishtowels, etc.), (3) fiber preferences among women who buy ready-made items (clothing or household), (4) characteristics which women seek and deem most important in ready-made items (appearance, durability, etc.), and (5) specific likes and dislikes with reference to cotton and rayon in ready-made clothing.

The sample was designed to be representative of all women in the United States between 18 and 65 years old and of all homemakers regardless of age. Whenever a household was found that had more than three women who met the requirements only three were interviewed. The sample, drawn on an area basis, consisted of 1,782 respondents.

In an analysis of the resulting data use was made of the concept of salience as an approach to ascertaining the importance attached by the women to specific characteristics of the products. Two types of questions were used to get at this point—checklist questions and open-ended questions. One open-ended question was: "What are the most important things you look for in buying a one-piece winter street dress?"

Spontaneous answers given to such a question indicate characteristics of the item which are most prominent in the thinking of the respondents at that time; that is, those which are salient for them.

The open-ended questions were supplemented by checklist questions in which respondents were asked to select one answer from several. For example, they were asked to choose the three statements from a list of eight which represented what was most important to them when buying a one-piece street dress. These checklist items were: (1) Is nice looking; (2) Is not expensive; (3) Will wear well; (4) Is the right weight; (5) Will dry-clean well; (6) Is practical and comfortable in cut; (7) Won't fade in the sun; and (8) Will wash and iron well. These questions came at the end of the interview—the corresponding open-ended questions were asked in the early part of the schedule. In each instance the question was structured in terms of importance to the purchasers, to offset the criticism that salient responses are not necessarily valid indicators of degree of importance to the respondent. By using the checklists the respondents were given a chance to select characteristics which might not have been thought of spontaneously but which they did consider important.

The relative salience of the various characteristics which were said to be important was represented by the "ratio of salience." First, the proportion of the respondents who mentioned a given characteristic as being important in reply to the open-ended question and the corresponding checklist question (counting only once those who gave the same answer to both questions) was determined. This proportion was designated as T . The proportion of the respondents who gave the particular characteristic spontaneously in answering the open-ended questions was found and indicated as S . The ratio of salience is $\frac{S}{T}$.

By way of illustration—47 percent of the respondents who bought ready-made one-piece winter street dresses gave in reply to both types of questions the answer, "practical and comfortable in cut" as an important characteristic they sought. In answer to the open-ended questions 25 percent gave this characteristic spontaneously. The ratio of salience for this item was 0.53. "Right weight" was the characteristic given by 47 percent of the respondents in reply to the two questions; 14 percent gave this reply spontaneously in answer to the open-ended question. The ratio of salience for this characteristic was 0.30. We find, then, that although the total proportions

were the same ($T=47$ percent in each case) the difference between the two ratios of salience indicates that in this type of dress "practical and comfortable in cut" is more important to these consumers than "right weight". The rationale for this conclusion is based upon the fact that the former characteristic was relatively more salient among those for whom it was important than was true of the salience of the latter characteristic among those for whom it was important.

Children's Clothing.—Another survey was directed toward mothers' preferences among selected items of children's clothing.

This survey can be used to illustrate a problem which plagues all open-ended interviewing—partial or incomplete answers. A systematic attempt was made to alert the interviewers to this difficulty. The "Interviewers' Instruction Manual" had a section of statements which were to be probed with respect to reasons either for preferring garment characteristics or for preferring different fibers. In addition to itemizing the responses, the basic levels to which the respondents were to be "pushed" were given. For example, a reply of "it's dressy," given as a reason was to be probed to see whether this referred to style, color, material, or fit. A reply of "launders well," was to be probed to get at whether this referred to dirt coming out easily, or material not having to be ironed, or that it dried quickly.

Men's Clothing.—Two surveys had to do with men's preferences for certain clothing items. The first of these (6) included shirts, extra trousers, summer suits, socks, pajamas, underwear, robes, and raincoats. Only owners of these items were questioned in detail about them. The general aims were to ascertain: (1) Preferences for competing fibers in the various articles of clothing, (2) beliefs regarding advantages and disadvantages of each of the competing fibers, (3) characteristics of finished garments that are considered important by consumers, (4) sources of dissatisfaction with particular items of clothing, and (5) person responsible in a family for actual selection of such items.

The sample was representative of all males in the United States living in households, who were 16 years or older. The households were selected on the usual area basis. If more than three men in a household fitted the criterion only three were interviewed. The sample was so designed that

an urban-rural analysis as well as analysis of the South could be made.

The other project concerned men's preferences among woolens, worsteds, and weaves. In recent years demand for clothing made of fine grades of wool has increased while surpluses of medium and coarser grades of wool have accumulated. There have been shifts in the styles in men's clothing also. Manufacturers of men's clothing have not known whether they were trying to cope with problems arising from short-term price trends or with the influence of long-range trends in style. This survey represented an exploration of the psychological dynamics involved in one aspect of consumer buying behavior which would be of use to wool producers, manufacturers, and retailers.

The purposes were to ascertain: (1) Ownership of suits (year-round and summer), separate jackets, overcoats, topcoats, (2) why men buy particular kinds of year-round suits, (3) men's preferences with respect to summer suits, (4) men's understanding of the terms "tropical" and "tropical worsteds," (5) causes of the increase in sales of separate jackets (sports jackets), (6) kinds of materials preferred in year-round suits and reasons for these preferences.

The universe from which the sample was drawn consisted of all males in the United States 16 years of age or over. The sample was drawn in such a way that regional analyses could be made in terms of the South, the North, and the Pacific Coast. Approximately 2,700 men were interviewed; but not more than three were interviewed in any one household.

Of the series of consumer preference surveys, the interviewing was, perhaps, most intensive in this one; that is, many more open-ended questions were used and the non-directive probing of responses was emphasized to the interviewers because the analysis of the problem required a knowledge of the value-judgments used by men in selecting within the items mentioned.

The combination of open-ended questions and intensive non-directive probing brought out value statements (both positive and negative) about prices, style, fit, durability, and other items.

In order to be objective in ascertaining men's preferences for kinds of materials in year-round suits the interviewers had two cards of samples of materials. Card A had samples of four types of woolen materials frequently used in men's suits;

they were of fine grade and were about the same color. Card B had samples of three materials not used frequently in suits; they were somewhat coarser than the materials on Card A. The method of paired comparisons was used with each card to learn the order of preference for the respective sets of materials among these men. Furthermore, an expression of preference was obtained between the materials preferred most frequently on Cards A and B, and the reasons were explored.

Generalizations

In concluding, some generalizations may be in order concerning the results of these consumer preference studies. To this writer the outstanding findings have been those showing the importance of quality in the opinions of consumers at the present time. Although price considerations, as demonstrated by negative statements about prices of the products and correlations between their use and income data, definitely are influential, the potency of the consumer's idea concerning quality apparently is primary. For example, 44 percent of the homemakers in the national potato survey (5) said they would buy fewer potatoes if they were of poor quality *and* relatively low in price. On the other hand, only 12 percent said they would buy less if the potatoes were of good quality *and* the price was relatively high.

It is true that the criteria of quality used by homemakers might not always be technically realistic, but it cannot be ignored that they function in the consumer's decision-making. Furthermore, the evaluation as to the quality of a product seems likely to take place in terms of external appearance, in terms of the way the product looks.

With respect to foods, the criteria of quality are used by homemakers to imply the value of the product in terms of taste and health. In regard to health there appears to be a growing appreciation of foods in terms of nutrients (particularly vitamins) but only a sketchy ability to deal with specific food-values (in regard to the specific vitamins, etc.).

One result of interest in the study on citrus products in Houston was obtained by using the method of paired comparisons for ranking six products in terms of preference in regard to taste. Frozen orange juice concentrate, although relatively new, is making rather remarkable progress

in sales, but this analysis showed that fresh citrus products (oranges and grapefruit) ranked considerably higher than processed products in the opinions of the respondents. However, among the processed items this new product ranked highest. Repetitions of this technique will yield a measure of any changes in the position of this product as time passes and the effect of such changes upon the positions of the other citrus products, and regional and socio-economic differences in the ranking of these products can be disclosed through application of this technique.

An over-all evaluation of this research on consumer preferences indicates that from the viewpoint of action-research the results of such studies are of value to Government administrators and to the private interests involved (consumers, retailers, wholesalers, and growers).

The integration of the findings into the systematic economics of demand-analysis appears to rest, however, on somewhat tenuous grounds. Whereas these studies contribute to our knowledge of consumers with respect to product-classes (citrus fruit, potatoes, men's clothing, etc.) we still need to develop a systematic conception of the principles involved in the behavior of consumers, which includes the psychological and sociological variables that are most certainly operative in influencing the behavior of consumers, irrespective of product-class.

One of the sources of these limitations might be found in the difficulty two groups of researchers have in communicating with each other—the economists and the “preference-analysts.” Each group represents, on the surface, a separate discipline. Each has its frame of reference. Each has its research tools. But, the two groups inevitably must overlap—with only *one* problem emerging where it had seemed that two existed. At present, apparently there are not enough people who are individually highly skilled in the two disciplines; it could hardly be otherwise since formal training in such a synthesis is rarely offered. How many of the agricultural economists who are interested in consumer preference research have had more than surface exposure to those areas of psychology which are important in this field? And, how many psychologists interested

in consumer preference research have had more than surface exposure to economics?

For the moment the way seems to lie in the direction of even closer cooperation between the representatives of the two fields. Such cooperation should strengthen the work since the joint effort will lead to better understanding of consumer behavior than one field can contribute alone. This better understanding is desirable not only from the scientific standpoint but also in order that the results of consumer preference-and-demand studies may be more useful and valuable to the Government and private interests involved.

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Capital and Credit In New Farming Systems

By Donald B. Ibach

Changes in farming systems require shifts in types of investment and expansion in the use of capital on farms. In this discussion the writer analyzes a capital, credit and loan repayment plan of aid in shifting from cotton to cotton-livestock farming on medium-sized farms in the Southern Piedmont area of North Carolina.

PRESSURE OF EVENTS in recent years has brought about the need for rapid changes in farming. The nature and extent of the needed changes vary with the type of farming. They are more drastic in the areas where the major crops are those which depend largely on an export market. Technological changes at home and new developments in other countries make the problem doubly acute in these areas. Furthermore, in some the prevalence of small farms and a generally low level of capitalization of the farm business intensify the difficulty of making desirable changes.

New capital investments are needed to make the changes possible. Frequently these new investments cannot be made without the use of credit. Returns from such investments are often delayed. Because existing assets are often inadequate as security for loans under usual credit practices, there is a call for the development of ways in which the potential lender's capital can be utilized more fully as an aid in making these changes, under an arrangement in which repayments are geared to the returns.

An analysis of the credit problems involved in making changes in farming systems in the Southern Piedmont area of North Carolina provides the basis for this discussion.¹ The report of that analysis outlines the existing organization, income, and expenses on small, medium, and large farms, and sets up budgets for the period of adjustment. The suggested change is from specialized cotton to cotton-livestock systems of farming. The analysis of the credit aspects of the problem as applied to a medium-sized farm is presented here. Medium-sized farms, as defined in this study, are

those on which from 45 to 74 acres are used for crops. Emphasis is on the principle of credit extension and loan repayment, based on appraisal of expected increases in net farm income both during and following the period of transition.

This analysis represents what good management can attain in the area. The data are not presumed to represent average results that would be obtained if all farmers undertook the shift from cotton to cotton-livestock farming. Many of the difficulties involved in the use of credit to bring about needed changes in farming are obvious. These include the problem of getting farmers to analyze the relative advantages and disadvantages of alternatives. Recognition of the soundness of certain alternatives in relation to existing systems, is also a creditor problem. In many instances, extension of credit on the basis of a conservative estimate of future returns from an improved system would be more profitable—to the creditor as well as to the borrower—than its use to finance present systems even when in the latter case the loan is amply covered by present assets. But because of new risks, a more careful analysis is needed, and this means some added costs as well as a change in the general attitude as to the potential role of credit in farming. Certain aspects of some of these problems are discussed more fully in a later section.

New capital investments that are needed in changing from cotton to cotton-livestock systems on medium-sized farms in this area include those for soil improvements, livestock, buildings and fences, and machinery.

Investments for soil improvement consist of use of lime, use of certain fertilizers that have a substantial residual effect hence are not applied every year, establishment of mechanical practices such as terracing, and the seeding of pastures and of perennial legumes. Although these improve-

¹ This present paper contains part of the analysis that is found in North Carolina Agr. Expt. Sta. Tech. Bul. 89, INVESTMENT CREDIT TO IMPROVE FARMING SYSTEMS, by D. B. IBACH and G. W. FORSTER. Raleigh, N. C. Dec. 1949.

ments are replaceable, they directly affect yields, and if they are maintained they result in a permanently higher level of yields. Because they increase productivity there is a basis for charging them off over a period of years. If credit is needed for any of these improvements, it is even more justifiable for those of this type, than for buildings, machinery, or even livestock, because soil improvements provide the foundation for future income.

Investment in additional buildings and fences, as shown in table 1, represents only the estimated necessary cash outlays rather than total value. Included in total value is the value of unpaid farm labor and farm-produced materials used. The principal items for the medium-sized farm are for poultry housing and fencing.

The added initial investment in livestock is mostly for three dairy cows or heifers. The dairy enterprise would be expanded through saving heifers until the desired number of producing animals is reached. An alternative would be to buy, at the start, the full number of cows. The choice would be determined by the farmer's experience with the dairy enterprise. In this area, the management now found on the existing representative cotton farm is relatively inexperienced with regard to problems that would arise in shifting from two or three ordinary cows that are accustomed to "roughing it," to a herd of, say, 10 high-grade dairy cows that would require reasonably good dairy-management practices. Aside from this factor, starting with a full-sized enterprise would represent sounder financing.

Changes in Farm Organization and Production

Major changes in farm organization consist of the addition of dairy and poultry enterprises. Many individual farmers in this area have made such changes but they have retained cotton as one of the principal sources of income. There would be a measurable reduction in the proportion of cropland used for intertilled crops, and a considerable increase in the proportion of total farm land in permanent pasture. These changes in land use, accompanied by increased annual use of fertilizer on some crops and investment in heavy applications of lime, phosphate, and potash for pasture and alfalfa, greatly change the quantity and nature of crop and pasture production.

TABLE 1.—*Loan advances for new investments during period of adjustment*

Type of investment	Year of adjustment			
	1	2	3	Total
	<i>Dol-lars</i>	<i>Dol-lars</i>	<i>Dol-lars</i>	<i>Dol-lars</i>
Soil improvement	503	0	161	664
Buildings and fences	815	116	0	931
Livestock	480	0	0	480
Machinery	138	0	0	138
Total	1, 936	116	161	2, 213

Changes in Farm Income and Expenses

Cotton would continue to be an important cash crop, but the income from cotton and from all crop sales would be exceeded by that from livestock enterprises. Farms in this area, as well as in the South generally, are operated with less capital relative to labor, than in most of the principal farming areas. The suggested adjustments would increase the amount of capital utilized and would create an all-year market on the farm for much of the available family labor (table 2).

The increases in the net cash farm income shown in table 3 come from changes made in the farming system that are supported by the new investments. Theoretically, the indebtedness incurred for each investment should be repaid from the returns attributable to that investment. But the nature of the farm business makes it impossible to obtain a good measure of the returns from each investment. For example, not all of the increase in yields and net value of crop production can be attributed to soil improvements.

Other practices—such as the use of improved varieties—do not require credit, but they increase the yields and, when used in conjunction with soil improvements, they contribute to sustained higher levels of crop production. The investment in a barn may yield returns through different livestock enterprises. A laying house contributes to increased returns from the poultry enterprise, but it is usually accompanied by better feeding, and attention to numerous items that represent good management. A laying house is built in recognition of the need for better utilization of the labor and feed available on the farm. Thus, in a credit

TABLE 2.—*Organization and principal items of production before and after adjustment*

Item	Unit	Before adjust- ment	Adjusted 5 years
Organization:			
Farm land:			
Cropland:			
Cotton.....	Acre.....	10. 3	10. 3
Corn.....	do.....	12. 3	10. 0
Small grain ¹	do.....	20. 3	16. 7
Lespedeza ²	do.....	7. 8	9. 7
Alfalfa.....	do.....	0	7. 7
Other—including garden.....	do.....	2. 3	1. 0
Idle.....	do.....	2. 0	0
Total cropland.....	do.....	55. 0	55. 4
Permanent open pasture.....	do.....	9. 6	23. 0
Woods, farmstead, etc.....	do.....	55. 4	41. 6
Total farmland.....	do.....	120. 0	120. 0
Percentage of—			
Cropland in—			
Intertilled crops.....	Percent.....	41. 1	36. 6
Legumes.....	do.....	14. 2	31. 4
Farm area in permanent pasture.....	do.....	8. 0	19. 2
Livestock:			
Dairy cows.....	Number.....	4	10
Hens.....	do.....	42	300
Production:			
Cotton lint.....	Hundredweight.....	51	54
All grain, corn equivalent.....	Bushel.....	621	965
Hay.....	Ton.....	13	32
Permanent pasture.....	A. U. M.....	22	83
For sale:			
Lespedeza seed.....	Hundredweight.....	18	43
Milk.....	do.....	129	548
Eggs.....	Dozen.....	181	3, 700

¹ Oats and wheat.² Lespedeza for seed or hay also grown following small grain.TABLE 3.—*Estimated cash farm income and expenses by years of adjustment*

Item	Year of adjustment					
	0	1	2	3	4	5
Cash farm income:	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Crops.....	1, 202	1, 556	1, 392	1, 393	1, 382	1, 145
Livestock and products.....	471	892	1, 241	1, 572	2, 003	2, 956
Total.....	1, 673	2, 448	2, 633	2, 965	3, 385	4, 101
Cash farm expenses.....	1, 013	1, 496	1, 555	1, 703	1, 764	1, 962
Net cash farm income.....	660	952	1, 078	1, 262	1, 621	2, 139

TABLE 4.—*Calculated repayments on the principal of new investment loans*

Item	Unit	Year of adjustment					
		0	1	2	3	4	5
Cash available for repayment ¹ -----	Dollar-----	60	352	478	662	1, 021	1, 539
Increase:							
Over base year-----	do-----	0	292	418	602	961	1, 479
Cumulative-----							
Actual-----	Dollar-----	0	292	710	1, 312	2, 273	3, 752
Percentage (5th year=100) ² ----	Percent-----	0	8	19	35	61	100
Repayments:							
Cumulative ³ -----	Dollar-----	0	177	420	775	1, 350	⁴ 2, 213
Annual ⁵ -----	do-----	0	177	243	355	575	863
Available for other purposes ⁶ -----	-----	60	175	235	307	446	676

¹ Net cash farm income (table 3) minus \$600 estimated cash expense for family living.

² The percentage the cumulative increase each year is of the total cumulative increase attained at the end of the adjustment period when income would be stabilized.

³ The percentages on the preceding line multiplied by the total loan advances.

⁴ Total of loan advances from table 1.

⁵ Difference between successive cumulative repayments.

⁶ Net cash available minus annual repayments on principal.

program, loans for all the capital items that mean a better utilization of farm resources, may be grouped, and the repayment schedule may appropriately be based on the estimated available net income.

The unit prices and costs used in developing these estimates are not forecasts. In general, they represent somewhat lower levels than are now being used by most price specialists. They are considered to be adequately conservative to provide a safety margin when developing farm budgets as a basis for the use of credit. The prices used recognize that the general agricultural and business economy can be prosperous while at the same time prices of some "surplus" crops might, without artificial supports, reach levels that would be unprofitable to all but the most efficient producers. Prices used for major sources of income (taken from North Carolina State Report to Improve Farming Opportunities in the South, June 30, 1946), are cotton \$0.124 per pound; milk \$2.90 per cwt.; eggs, \$0.28 per dozen. Major items of expense are fertilizer at from \$28 to \$39 per ton depending on grade; dairy and poultry supplemental feeds \$2.50 and \$3.25 per cwt., respectively; ginning, \$4.90 per bale, and custom combining of small grain, \$3.50 per acre. In this table, cash farm expenses do not include interest on loans for new investments.

A Method of Calculating Repayments

Repayments on the principal of all new investment loans are related to the increases in the net cash farm income, minus family living needs, cumulative to the year in which it is estimated that the adjustments would be completed. The last item of table 4 shows the estimated cash left after principal payments; it is available for other purposes, including the payment of interest on unpaid balances.

Whether the repayment schedule is arranged to liquidate all, or only part, of the loan by the time income stability is attained, is a matter to be decided according to the amount of cash income that will probably be available each year for the purpose. In some instances, the expenditures for family living will have to be increased during the period of adjustment. Investments in home improvements are needed on many farms. Some of these types of investments not only improve the living conditions but they are reflected indirectly in greater efficiency in farm production. Therefore, in working out loan repayments in individual cases, attention should be given to probable needs for increasing the budget for family living and household investments.

The repayment schedule suggested here represents a compromise between the system of short-

term credit as now generally practiced and a plan that would be truly in keeping with the nature of the investment. As the investments are of a permanent character there is sound basis for spreading the repayments over a much longer period, provided the borrower is carrying out the plan and is maintaining the value of the improvements, aside from unavoidable depreciation.

Comparison of Repayment Plans

Figure 1 illustrates the principle of annual repayments based on anticipated returns from the new investments on the medium-sized representative farm. The three curves represent: (1) the net cash available annually for repayments during the 5-year transition period; (2) the annual payments of principal and interest when computed as indicated in table 4; and (3) the annual payments required to retire the loan during the same period, when computed according to the standard amortization plan of equal annual installments. The curve illustrating the standard amortization plan is not level throughout the period because the loan is not all advanced in the first year.

The suggested plan follows the general shape of the curve of increasing farm income. With each succeeding year after the first, the spread widens between the available income and the repayments that are based on increases in income. This has practical advantages because as net farm income rises from a very low or moderate level, there is opportunity to make improvements in the house or to improve the level of living. Where new investments for more profitable farming are most needed, there is usually a backlog of unfilled needs. The repayment plan should take this into account either by progressively increasing the sum estimated for family living, or by leaving room for some increase in living expenses after the scheduled repayments are made (figure 1).

The standard plan is unrelated to the farm income that is available to retire debt. It would require a payment the first year that would be larger than the amount of the available cash. The payment the second year would leave no margin for contingencies. Taking the deficit the first year into account, this plan could be followed only if the farmer reduced living expenses during the first 3 years below the nominal sum of \$600 set aside for this purpose. If careful esti-

mates of net cash income are made, such a plan of repayments would not be set up in actual practice for cases similar to the one illustrated. But without such estimates, this plan of repayment would bring hardship and disappointments. A forward-looking analysis of the farm business will demonstrate the soundness of investment-credit programs that relate annual repayments to increasing returns.

Figure 1 suggests a principle which may be applied generally to medium-sized cotton farms in the Piedmont area on which credit is to be used to aid in making the change to a cotton-livestock system. The percentage the cumulative repayment each year is of the total, is given in table 4. Each of these subtracted from the succeeding one, gives the percentage the annual principal payment is of the total, when scheduled as indicated. Thus, for the medium-sized farms of this description, assuming that progressive improvement in management accompanies the changes made, and with price relationships as indicated, a 5-year repayment plan for a loan of appropriate size might properly call for retirement of about 8, 11, 16, 26, and 39 percent of the principal each year from the first to the fifth, respectively. Amortization tables that provide for increasing annual payments per \$1,000 of principal, could be based on different sets of percentage data like these, after analyzing such a repayment plan as applied to different types and sizes of farms. This approach would provide numerous plans, each of which would be designed to fit a representative set of conditions. The actual credit program for a farm would then take into careful account any factors that render it different from the representative farm. For example, increases in income available for repayment may be less, in individual cases, than that estimated for the representative situation. But, after developing a farm plan and deciding upon the loan program, it would be possible to select the repayment plan that best suits the conditions.

The Farmer-Borrower's Cash Position

The farmer's cash position, from the beginning through the adjustment, is shown in table 5. This table summarizes the financial picture, showing the unpaid balances at the beginning of each year, the interest payments, and the cash remain-

TWO PLANS FOR PAYMENT OF PRINCIPAL AND INTEREST ON NEW INVESTMENT LOANS COMPARED WITH NET CASH FARM INCOME AVAILABLE

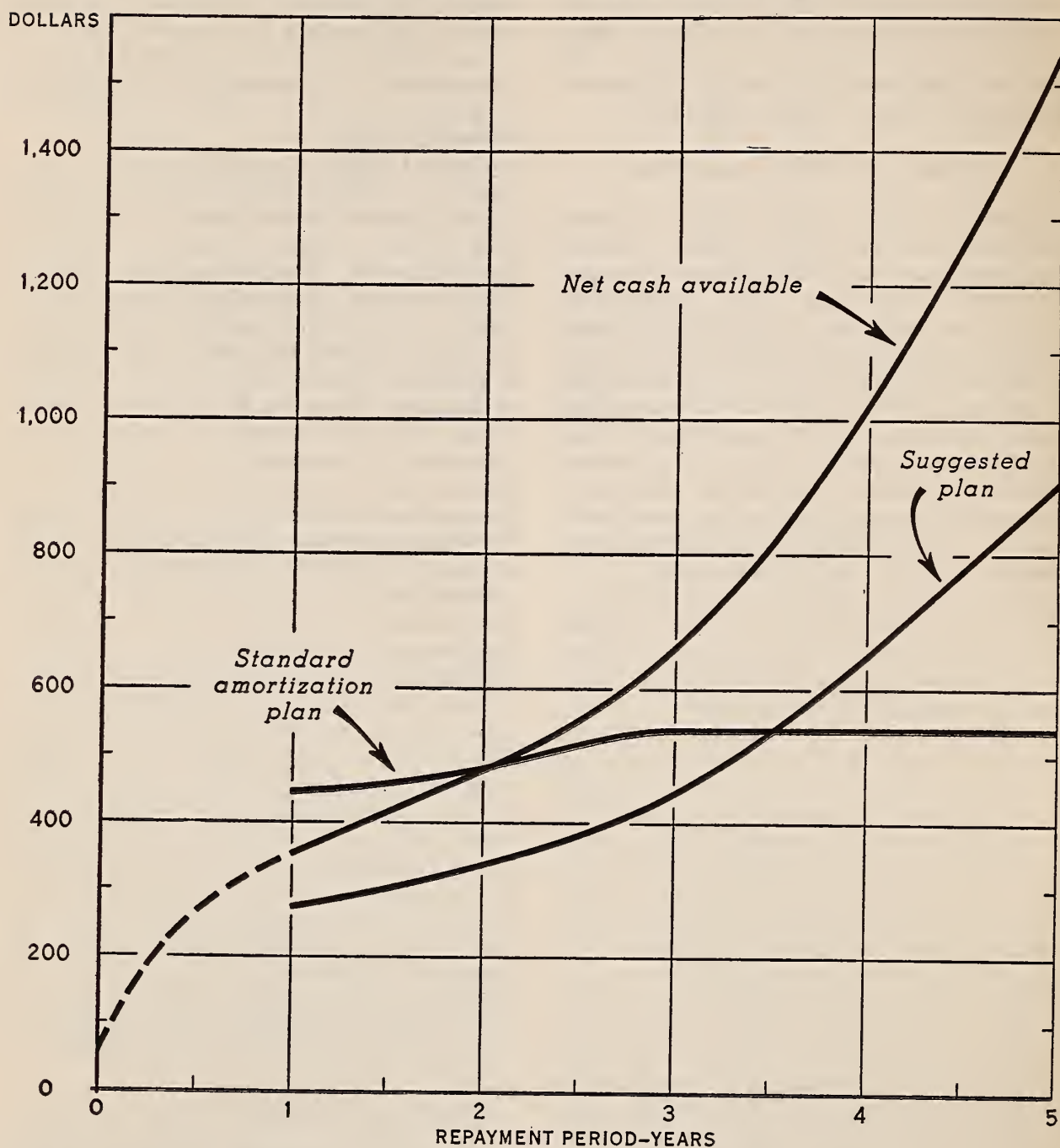


TABLE 5.—*Loan advances and repayments as related to net cash income available*

Year of adjustment	Loans for new investments			Net cash income available ²	Principal payments ²	Unpaid balance beginning of year	Interest payments at 5 percent	Total principal and interest payments	Available for other purposes
	Soil improvement	Other ¹	Total						
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
1.....	503	1, 433	1, 936	352	177	1, 936	97	274	78
2.....	0	116	116	478	243	1, 875	94	337	141
3.....	161	0	161	662	355	1, 793	90	445	217
4.....	0	0	0	1, 021	575	1, 438	72	647	374
5.....	0	0	0	1, 539	863	863	43	906	633
6.....	0	0	0	1, 539	0	0	0	0	1, 539

¹ First year, \$480 for dairy cows, \$138 for grain drill, \$815 for buildings and fences. Second year, additional fences.

² From table 4.

ing for other purposes such as increased expenditures for family living, household improvements, or other investments.

The loan contract would allow for, but would not require, a more rapid repayment than that based on a conservative estimate of the total cash income available for retirement of debt. Whether the schedule calls for completion of repayments earlier or later than indicated, it would be based on the cumulative increases in the net cash available. The rate of repayment is a matter to be determined by local conditions, including natural and human risks. The important thing is to gear the repayments to conservative estimates of returns, rather than to a fixed period of years.

Changes in Borrower-Creditor Equity

The investment position of farmer and lender is summarized in table 6, in which is shown the gross investment, the indebtedness, and the net worth for each year during the repayment period. At the end of the period, repayments are completed and depreciation is not offset by any further reduction in debt that would increase the operator's equity. At the end of the repayment period this operator's assets will have increased by \$4,586. As there was no indebtedness at the beginning of the first year, this sum represents the increase in net worth as a result of the changes.

The ratio of unpaid obligations to gross assets is a measure of the creditors' margin of safety. It has been said that there are "sound" loans, and

"safe" loans. The former are based on a reasonable estimate of the productiveness of the venture; the latter have a good margin of safety between the value of the property taken as security and the size of the loan. The possibility of default in payments necessitates a good margin of safety, even though careful analysis indicates that a larger loan would be justified. The type of credit program here suggested for the Southern Piedmont is sound, if estimates of income available for repayment are based on experience and are adjusted for special factors that may be present in each case. In the illustration here given, such a program is also safe, as is indicated by the low ratio of indebtedness to gross value.

In footnote 1 of table 6, reference is made to the re-appraised value of land, beginning in the fifth year. The increase in productive value is derived through capitalization of the estimated increase in the net rental share of crop production, after allowing for annual expenditures for maintenance of soil improvements and additional cash expenses and depreciation on buildings as a result of the new investments. Derived in this way, the increase per acre in land value would be about 8 dollars. The known effects of the soil-improvement investments on crop yields justify such a re-appraisal. In developing the re-appraised value, net rent is capitalized at an interest rate 1 percent higher than is used in arriving at present capitalized value. This is done as a means of offsetting the influence of improved management that is reflected in the part of the increased yield that

TABLE 6.—*Investment, indebtedness, and net worth of the farm business during the period of adjustment*

Item	Unit	Year of adjustment					
		1	2	3	4	5	6
Assets:							
Land ¹	Dollar.....	5, 835	5, 000	5, 000	5, 000	6, 779	6, 779
Other real estate ²	do.....	1, 219	3, 073	3, 099	3, 008	2, 917	2, 826
Livestock.....	do.....	665	1, 266	1, 471	1, 816	2, 787	2, 787
Machinery and equipment ²	do.....	386	483	437	391	345	299
Total	do.....	8, 105	9, 822	10, 007	10, 215	12, 828	12, 691
Indebtedness ³	do.....	1, 936	1, 875	1, 793	1, 438	863	0
Net worth ⁴	do.....	6, 169	7, 947	8, 214	8, 777	11, 965	12, 691
Indebtedness as a percentage of assets.....	Percent.....	24	19	18	14	7	0

¹ Land value after the first year reflects value of timber removed for use in new buildings. The re-appraised value is shown, beginning in the fifth year.

² Data reflect depreciation and the value of new investments.

³ Unpaid balances on investment-loan advances. No initial indebtedness.

⁴ At the end of each year.

is unrelated to soil improvement. Another reason for using the higher rate in developing the re-appraised value is to allow for the probability that, as farm income rises, part of the increase will be used for family living, so that all of it would not properly be capitalized in calculating the increase in land value. Adjusting the rate of capitalization provides a simple method of taking these influences into account.

A Successful North Carolina Cotton-Livestock Farm

The potential role of credit for new capital investments depends on whether the changes are feasible and profitable. This question has apparently been answered in the affirmative with regard to changes from cotton, to cotton-livestock systems in the Southern Piedmont area. A brief description of the farm organization, and a statement of income and expenses for one farm in this area is given to illustrate what may be accomplished.

Crop acreages, livestock numbers, and a financial summary, are shown in table 7 for a farm in Union County in North Carolina. There are 60 acres of cropland and permanent open pasture on this farm, compared with 78.4 acres on the reorganized medium-sized representative farm as shown in table 2. The income is shown in terms of the prices that were used in the analysis of the representative farm. The actual net cash

farm income in 1947 was, of course, much greater than that shown in table 7. The total net cash farm income shown for the medium-sized representative farm, after reorganization, is \$2,139, (table 3), compared with \$1,994 obtained by the operator of the farm in Union County, if the 1947 sales and expenses are calculated on the same price basis. Net cash farm income per acre of cropland and permanent pasture for the farm in Union County is nearly \$6 larger than that of the reorganized medium-sized farm. If the net cash income per acre for the Union County farm was applied to the larger acreage of the representative medium-sized farm, the total net cash income of the latter would be about \$450 more than is estimated in this analysis.

The cotton-livestock system is followed on this actual farm, but a larger flock of hens is maintained than is indicated for the representative medium-sized farm. The pullets are provided with a range shelter placed on clean ground. Most of the important improved practices are followed; for instance, Ladino clover is used in combination with orchard grass for pasture, in addition to Sudan grass or lespedeza to furnish summer grazing for the dairy herd. Such practices, together with proper treatments of the soil and feeding of proper rations, have paid good returns. Table 7 indicated that they could pay good returns under much less favorable price conditions than those now prevailing.

TABLE 7.—*Organization, income, and expense of a successful cotton-livestock farm, Union County, North Carolina*¹

Item	Amount	Item	Amount
	<i>Acres</i>		<i>Dollars</i>
Organization:		Income:	
Farm land:		Cotton.....	576
Cropland:		Cottonseed.....	93
Crops:		Milk.....	1, 001
Cotton.....	7. 0	Cull cows.....	180
Corn.....	2. 5	Eggs.....	4, 828
Wheat.....	9. 0	Poultry.....	356
Oats.....	12. 0	Pigs.....	25
Barley.....	4. 0	Total.....	7, 059
Hay.....	19. 0		
Garden.....	1. 5	Expense:	
Total.....	55. 0	Crop:	
Double-cropped.....	9. 0	Fertilizer.....	² 454
Total.....	46. 0	Lime.....	² 18
Idle.....	2. 0	Other.....	² 350
Total cropland.....	48. 0	Livestock:	
Open pasture.....	12. 0	Feed.....	2, 938
Farmstead and woods.....	2. 0	Chicks.....	100
Total farmland.....	62. 0	Other.....	88
	<i>Number</i>	Machinery and equipment.....	604
Livestock:		Farm improvement.....	115
Dairy cows.....	⁴ 10	Hired labor.....	252
Hens.....	⁴ 1, 000	Taxes and insurance.....	146
Sows.....	1	Total.....	5, 065
		Net cash farm income.....	1, 994

¹ Data for the organization and production are for the year 1947. Income and expenses are computed on the basis of price and cost rates used in developing table 3.

² Includes 15 tons of fertilizer and 4.5 tons of lime. In addition, 6.45 tons of fertilizer on pasture, and 17.75 tons of lime were applied, the cost of which is not a recurring

annual expense, but an investment charged off over a period of 5 years. One-fifth of the cost of this additional fertilizer and lime has been included here.

³ Baling, combining, ginning, cost of seeds and plants.

⁴ On hand, end of year. Not average number in production during the year.

These returns were obtained at a capital investment (not including dwelling) of approximately \$11,500, which is comparable with that shown for the reorganized representative medium-sized farm. A barn and a poultry house were built in 1946, using farm materials when possible. The farmer, and other members of the family, did most of the work. The cash cost of the buildings was about \$800. Three brooder houses were built with lumber from obsolete buildings. These have cared for as many as 1,300 chicks, handled in three broods during a season. The farm buildings are simple but they fill essential functions in a way that is not always true of those that cost much more. Practices regarding farm buildings are commensurate with those relating to

fertilizer, cropping, and feeding, in helping to maintain a high standard of efficiency in the use of productive resources. They emphasize that expensive investments in farm buildings are not necessary when getting started in livestock enterprises here. The total value of farm-service buildings (not including the dwelling) on this farm is approximately \$2,000. At the close of 1947 the livestock and equipment were valued at \$2,450 and \$3,579 respectively. The latter figure includes \$2,300 for a tractor and truck.

Demonstrations of profitable changes in farming may be observed in all counties in the Southern Piedmont area, and similar changes are being made on farms in other parts of the State. These farms serve to illustrate the feasibility not only of

cotton-livestock systems of farming, but also of the use of credit, when it is needed to enable good farmers to make the necessary new investments.

Problems in Use of Credit to Improve Farming Systems

In this area, and on many farms in other areas, there is need for developing farm capital investments so that farmers can utilize the benefits of modern technology in conducting an efficient farm business. As organized now, the medium-sized farms in this area have net incomes only barely large enough to permit a nominal expenditure of \$600 for family living, at prices used in this analysis. In a study of farming opportunities in this area it was found that medium-sized farms comprised nearly half of all those included in a selected sample.² On the small farms, which comprised nearly one-third of the sample, the situation is much more acute. The farms in both of these groups need changes that will permit reasonably good management to yield higher incomes. These changes require capital investments that cannot be paid for out of earnings from the present organization at conservative prices. In the case of the small farms (excepting those operated as part-time farms) there is need for additional land.

Additional problems arise when credit is based largely on anticipated returns rather than altogether on the farmer's equity. Then the farm plan becomes of still greater importance. Technical assistance, and a means of checking on current progress, become an essential part of the credit program. This combination has been practiced in some of the governmental credit programs, such as that of the Farmers Home Administration. Commercial lenders might find ways of entering this field, and ultimately make such loans generally available to farmers who need them, who can qualify, and who are willing to develop adequate farm plans as a basis for loans. The general procedure would be no different from that in current practice, except that the economic basis for the loan would rest primarily on a complete

and conservative estimate of future net returns.

Private capital might be drawn into this type of investment credit through a plan of governmental under-writing of development loans to farmers on much the same basis as is now practiced in the case of home owner loans. Potential loan funds might be obtained through sale of a special type of farm-investment credit bonds based on carefully placed and properly serviced loans. If the loans were placed for only sound undertakings as revealed by well-developed farm plans, they would pay out. A governmental guarantee would not need to cover the entire investment in order to provide adequate insurance to the investor. This kind of an arrangement would involve certain additional costs incident to the development of the farm plans, and some follow-up technical assistance. A substantial part of such additional costs might perhaps be met from public funds as the expenditure would be in a program to promote changes in farming that would be consistent with most efficient use of farm resources.

The function of servicing this type of credit through adequate farm planning and follow-up assistance calls for further development. This could take the form of a training program that would include appropriate representatives of lending agencies. This training would aid them in judging the adequacy of farm plans without working out all of the details. Under such an arrangement borrowers would be included in the plans of the agencies that assist farmers in making their plans. To the extent that these are public agencies, this phase of the cost of credit might be borne by public funds along with other educational and service work.

Several nonlending agencies of the Department of Agriculture (such as the Soil Conservation Service, and some of the State Agricultural Extension Services) have programs that include the development of farm plans with a great many farmers. In some States assistant county agents are employed for this work. A separate farm-management advisory service has been suggested as a means of encouraging desirable changes in farming or of strengthening existing systems in which no major changes are needed. Its function would be to fit technical recommendations into well-rounded farm plans and to test the economic feasibility of alternative combinations of enterprises and practices. Commercial farm-

² This study, OPPORTUNITIES FOR ADJUSTMENTS IN FARMING SYSTEMS IN THE SOUTHERN PIEDMONT AREA OF NORTH CAROLINA, by W. W. McPHERSON, W. H. PIERCE and R. E. L. GREENE, was published in Sept. 1949 as North Carolina Agr. Expt. Sta. Tech. Bul. 87. Raleigh, N. C.

management service agencies might sell this kind of planning assistance profitably to operators of family-size farms. Whether such planning and follow-up assistance were rendered by a private or a public agency, the farm plan would service both borrowers and lending agencies in a way to insure the success of this type of credit program.

As research and educational agencies are continually pointing out new developments that can

mean more efficient production, there is an ever-growing problem of combining managerial skill with natural and capital resources in order to take advantage of these developments. This problem involves the lending agencies and the agencies that assist farmers in developing farm plans, if credit is to attain its potential role as a major activating agent in promoting desirable adjustments in farming.



The War Records Project of the Department of Agriculture

By Wayne D. Rasmussen and Gladys L. Baker

Current interest in experiences of World War II invites a report on the War Records Project of the Bureau, beginning with its establishment in the Department by the Secretary of Agriculture on December 31, 1941.

THE DEPARTMENT PROJECT was one part of a Government-wide project initiated by the Bureau of the Budget after that agency found that the records of World War I were in an unsatisfactory condition as far as its needs were concerned. This feeling of the inadequacy of records of experiences in that war was widespread. The Extension Service, for example, when drawing up plans for the mobilization of local farm labor, found that records of a similar activity carried on during World War I were virtually nonexistent. Then it was recognized that careful and succinct analyses of current achievements were needed as well.

Thus, when the Bureau of the Budget requested the Secretary of Agriculture to compile a history of the administration of activities of the Department as they related to defense and war efforts, the Secretary responded by a memorandum dated December 31, 1941, which assigned the responsibility for the compilation of such a history to

the Director of Information, and asked all agencies of the Department to send quarterly concise histories of their defense activities to the Director.

After the entrance of the United States into the war, the Bureau of the Budget expanded its project. An Advisory Committee on the Records of War Administration was appointed as a result of a letter from President Roosevelt to the Director of the Bureau of the Budget dated March 4, 1942. The Committee had two primary functions: (1) to stimulate the major war agencies to set up historical units so as to develop and preserve full and accurate records of their war-time experience and (2) to advise the special research staff within the Bureau of the Budget on current analyses of administrative problems in major policy fields of the war. Subsequently, the War Records staff of the Bureau of the Budget, drawing in large measure upon materials collected and prepared by the War Records staffs of the Government departments and agencies,

summarized the administration of wartime governmental programs in a volume entitled *The United States at War*.¹

In the fall of 1943, the Social Science Research Council decided that the work of the Government ought to be supplemented by the action of private groups. It established a Committee on War Studies to work with the Government projects and to interest qualified scholars in the plans. The Advisory Committee on Records of War Administration and the Committee on War Studies cooperated closely through the war's duration.

Both President Roosevelt and President Truman defined the project as an aid for improving governmental administration as well as an important historical undertaking. On January 25, 1944, President Roosevelt wrote in a letter to the Director of the Budget: "We need both for current use and for future reference a full and objective account of the way the Government is carrying on its wartime duties. . . . The best way to advance our knowledge of administration is through the study of actual experience. . . . There is much to be gained from our wartime experience for improving administration in the future." Later, on July 6, 1945, President Truman wrote: "I would like to see completed soon after the war is over an objective account of how problems of administration were handled. Both failures and successes should be analyzed. The development of governmental administration can be greatly aided by such investigation."

Meanwhile, the Office of Information had begun the collection of quarterly reports prepared by the agencies. But the enlargement of the project to include the collection, preservation, and organization of war records on a historical basis, combined with the pressure of other wartime duties on the Office of Information, led to the informal transfer of responsibility for the project to the history staff of the BAE by June 1942. Formal transfer was made by the Secretary in a memorandum of January 16, 1943.

The War Records Project staff of the BAE, with a special consultant, Dr. John M. Gaus, developed two major lines of work: (1) the collec-

tion, preservation, and organization of documents relating to the wartime administration of the Department, including the War Food Administration and (2) the preparation and assistance in the preparation of historical accounts of some of the major war programs of these agencies and of the wartime changes in various sectors of agriculture.

In other instances, additional material relating to key programs was obtained from the persons responsible for the programs. Officials were interviewed by staff members regarding programs and actions, both for aid in the interpretation of documents and for information on given programs that could not be derived from written records; reports of these interviews were placed in the file. Many of the items in the file are classified and are therefore available only to designated Government research workers. But a definite effort is being made to secure the declassification of some of the material.

In spite of these restrictions, the documents and the reports, organized according to a program outline, contain material that has been of considerable assistance to Department officials and research workers. At the present writing, the situation in Korea brings many requests for information that are filled by recourse to the file. It will eventually be transferred to the National Archives.

In the course of collecting and organizing material bearing on the wartime administration of the Department no attempt was made to duplicate archives in the agencies. In some cases, the quarterly reports were sufficient documentation for the activities of those agencies. However, because of the pressure of day-by-day war activities and constantly changing programs, none of the constituent agencies of the WFA made reports; but so far as possible copies of key documents relating to the programs of nonreporting agencies were made and placed in the file. Emphasis was laid on the selection of documents basic to the objectives of the project and on the collection of minutes of meetings of interagency committees dealing with basic war problems, copies of documents dealing with major decisions on policy, and other documents of the kind which often do not find their way into the regular files of the Department.

¹ UNITED STATES BUREAU OF THE BUDGET. *THE UNITED STATES AT WAR; DEVELOPMENT AND ADMINISTRATION OF THE WAR PROGRAM BY THE FEDERAL GOVERNMENT*. 555 pp. Washington, U. S. Govt. Print. Off. 1946.

The project staff, never more than four professional workers, undertook to prepare narrative accounts providing a current description of administrative problems and developments of the Department and of the WFA's adjustment to the war crisis. These accounts were organized both by agency developments within the Department and by subject matter cutting across agency and departmental lines. Several of the accounts, limited in scope and in the time periods covered, were prepared for particular administrative uses. Other longer and more general accounts of departmental organization and programs were based in part upon classified records so their publication must await the declassification of such records.

During 1945, through a joint arrangement of the Bureau of Agricultural Economics, the College of Agriculture of the University of Wisconsin, and the Social Science Research Council, Walter W. Wilcox undertook a general study, the purpose of which was to give an integrated picture of the important economic forces affecting farmers of the United States during World War II. Professor Wilcox drew upon the file of the War Records Project in the preparation of the volume and other project staff members assisted in the work. In addition, specialists throughout the BAE, in other Government agencies, and in the University of Wisconsin, provided data and other assistance in their fields of interest. The volume was published by the Iowa State College Press in 1947 under the title *The Farmer in the Second World War*.

In connection with Professor Wilcox's project, a series of monographs was planned to present in detail the wartime changes in certain sectors of agriculture. Specialists in the Bureau and

elsewhere in the Department were asked to prepare studies in their respective fields under the leadership of the War Records Project. Seven such studies were published as a War Records Monograph series.² They covered farm machinery and equipment, soil conservation, sugar, veterans' preference for new farm machinery and equipment, the acquisition and use of land for military and war production purposes, production and price-supporting programs for fats and oils, and wool. The series was discontinued during the last year when publication matters in the Department were somewhat reorganized, and the next two monographs, covering citrus fruits and agricultural wage stabilization, have appeared in the new departmental *Agriculture Monograph* series.³ Additional studies dealing with the Department's farm labor program, with meat and meat animals, and with the concentration of food authority, in addition to a chronology of the War Food Administration, are nearing completion and may be published during this year.

² See War Records Monographs of the Bureau of Agricultural Economics. 1. FARM MACHINERY AND EQUIPMENT, by ERLING HOLE; 2. SOIL CONSERVATION DURING THE WAR, by GEORGE W. COLLIER; 3. SUGAR DURING WORLD WAR II, by ROY A. BALLINGER; 4. WAR FOOD ORDER 135, VETERANS' PREFERENCE FOR NEW FARM MACHINERY AND EQUIPMENT, by F. M. JOHNSON; 5. ACQUISITION AND USE OF LAND FOR MILITARY AND WAR PRODUCTION PURPOSES, WORLD WAR II, by ALVIN T. M. LEE; 6. FATS AND OILS IN WORLD WAR II: PRODUCTION AND PRICE-SUPPORTING PROGRAMS, by ROBERT M. WALSH; 7. WOOL DURING WORLD WAR II, by JOHN W. KLEIN. 1946-48.

³ HOLMAAS, ARTHUR J. AGRICULTURAL WAGE STABILIZATION DURING WORLD WAR II. U. S. Dept. Agr. Monog. 1, 140 pp. June 1950; PUBOLS, BEN H. CITRUS FRUIT DURING WORLD WAR II. U. S. Dept. Agr. Monog. 3, 77 pp. June 1950.

Methods Used in a Survey of Orchards (Michigan Cherries)

By H. F. Huddleston

Comparisons are here made of different methods of estimating the number of cherry trees in a survey of commercial orchards. The author also discusses some problems encountered in the use of lists and gives a comparison of costs when the mailed questionnaire and the interview sample of non-respondents are used.

IN MICHIGAN the cherry industry is continuing to grow in importance. Every alternate year since 1940 has brought a new record crop and in the last 5 years production was 44 percent larger than it was in the preceding 5 years. With this expansion many questions have arisen in the minds of both growers and processors. The Michigan Cooperative Crop Reporting Service, representing BAE and the Michigan Department of Agriculture, was requested to get answers to the following questions to serve as a long-range planning guide to growers and processors:

1. Is the increase in production due to an increase in plantings, to trees of a longer life, to an increase in yield per tree, or to a combination of any or all of these factors?

2. If there has been an expansion in tree numbers, where has it taken place?

3. What is the age distribution of present trees?

4. What number of bearing trees should be used when estimating production in the next few years—until 1950 census data are available?

A survey was made with RMA funds. The industry wanted data on tree numbers by counties and more detailed information by crop-reporting districts. The funds, personnel, and time available indicated a combined mail-and-interview survey as the most efficient design.

In this survey a commercial cherry orchard (or farm) was defined as an orchard with 50 or more cherry trees. However, an orchard (or farm) in this case represents an operating unit and includes, in some instances, two or more farms. For example, if a father and son operated two farm tracts jointly, these tracts were considered as one unit.

Questionnaires were mailed during the third week of February 1949 and a follow-up mailing

to non-respondents was made in early March. Usable returned schedules totaled 2,170 or 54 percent of those mailed out. To learn whether the operations of those producers who did not respond differed significantly from those who replied, 20 names of non-respondents, plus several alternates, were drawn at random in each of 10 counties. These orchardists were interviewed between March 22 and April 7. This technique of integrating mail and interview sampling was used in arriving at estimates for counties. In addition, district production data were used as a check on tree numbers. The interviewing was done in the following counties: Antrim, Grand Traverse, Leelanau, Benzie, and Manistee in the northwest district; Mason and Oceana in the central west district; Allegan, Van Buren, and Berrien in the southwest district.

The number of growers interviewed was proportional to the number of non-respondents in the stratum or district, with the restriction that 20 growers were to be interviewed in each county selected. The probability of any county in a stratum being selected was proportional to the number of non-respondents in the county.

There are several sources of error in a survey of this kind. First, it is almost impossible to obtain a complete list of current growers because of changes in ownership or rentals, or because an orchard may be listed twice under different names. Second, there may be errors, for example, in memory; some growers do not know how many trees they have or when they were planted. Third, the results are subject to sampling errors. In general, the sampling error for total district tree numbers, including both bearing and non-bearing, can be expected to be less than 10 percent in 19 cases out of 20, as explained later. The greatest sampling

errors are to be expected where relatively few growers reported on items, such as the percentage of fall plantings in the large size groups.

For the interview sample of 200 farms, the total travel and personnel costs were \$2.71 per schedule. Enumerators averaged 7.5 interviews per day and traveled 13.5 miles per interview. Total costs for the interview sample were about \$4 per schedule. Total costs for the 2,170 schedules obtained by mail were about 70 cents a schedule.

Some Characteristics of Interview Sample and Mail Returns

The sample of non-respondents for the 10 counties was studied to gain knowledge of possible mail biases. Those points which seemed to be of general interest were selected for examination. Some differences between the mail respondents and the non-respondent universe were noted, but they are not unlike those frequently found in other populations sampled for agricultural data. The following differences were clear: (1) The mail respondents are dominated by the larger growers; (2) the mail respondents have been planting more trees during recent years, as evidenced by the smaller percentage of bearing trees (hence they had a greater interest in the survey); and (3) the mail respondents apparently have a smaller proportion of sweet-cherry trees in their orchards (except in the southwest district), but some growers may have failed to report sweet-cherry trees because, comparatively, they are not commercially important.

Successive Mailings in Grand Traverse and Leelanau Counties

Selectivity in mail returns has long been one of the major weaknesses in the voluntary mail sample, particularly in special surveys for which no historical series are available with which to true up the results. Third and fourth mailings were made to Grand Traverse and Leelanau Counties, in the hope of getting some information about a possible bias in the mail return and about possible duplications in the mailing list.

Several points regarding method are obvious from a study of the data. The response dropped off sharply after returns from the second request were in. The trend in returns from successive

mailings was not consistent at the county level, but when the counties were combined the trend was more consistent. This seems to bear out the preliminary conclusion of Hendricks¹ that adjustment for bias from such a trend in a mail survey may be of limited usefulness in a small finite population; probably 50 to 100 returns are needed from successive mailings to learn consistent trends. Publicity by radio, newspapers, and local Extension people was stopped after the second request was made. Hence the response to the third and fourth requests was rather low. But the two additional mailings to Grand Traverse and Leelanau Counties were of most value in verifying the presence of duplications in the mailing lists and for estimating the number of them. Approximately one-third of those who responded to the third and fourth requests indicated that their orchards had reported previously under a different name.

District and County Estimates

District estimates of the total number of sour-cherry trees were obtained as follows: A ratio estimate² (the total production in each district for non-respondents, multiplied by the ratio of trees to production in the interview sample) was computed; this figure was added to the number of sour-cherry trees for the stratum reported by mail. The integrated estimate is thus derived from both the mail returns and the interview sample of non-respondents. This total production for all non-respondents in a district was obtained by taking the difference between the total production for the district—as estimated by the Agricultural Statistician—and the production reported by the growers who answered the mail inquiry.

An alternative estimating procedure, a regression or double-sampling method, was also tried for each district.³

First, an estimate of tree numbers was derived for each county by multiplying the average trees per grower, as reported on the mail questionnaire,

¹ HENDRICKS, WALTER A. ADJUSTMENT FOR BIAS BY NON-RESPONSE IN MAILED SURVEYS. This magazine 1 (2): 52-56, 1950.

² COCHRAN, W. G. SAMPLE SURVEY TECHNIQUES. N. C. State College and Bur. Agr. Econ., 1948. (Processed.)

³ FINKNER, A. L. METHODS OF SAMPLING FOR ESTIMATING COMMERCIAL PEACH PRODUCTION IN NORTH CAROLINA, N. C. Agr. Expt. Sta. Tech. Bul. 91. 1950.

TABLE 1.—*Estimated tree numbers from mail returns alone and from mail returns plus non-respondent interviews for counties in which non-respondents were interviewed*

County	Mail estimate	Integrated estimate (mail and interview consolidated)	1945 census
	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>
Antrim.....	121	108	101
Benzie.....	164	143	147
Grand Traverse.....	787	715	572
Leelanau.....	553	498	418
Manistee.....	95	87	76
Mason.....	119	143	99
Oceana.....	558	529	521
Allegan.....	95	78	83
Berrien.....	391	340	330
Van Buren.....	214	197	121

by the number of growers per county. The only control data, or basis for expansion into county estimates, was the number of growers per county. A second estimate was derived for each of the 10 counties with an enumeration sample as follows: The average number of trees per orchard, reported in the sample of 20 enumerated orchards, was multiplied by the number of growers who did not reply to the mail inquiry. This estimate for the non-respondents was added to the number of trees reported by mail to derive an integrated, and presumably an unbiased, estimate of all trees in the county. These two sets of estimates are shown in table 1, together with 1945 census data, for purposes of comparison.

For the 10 counties in which an enumeration was made, a regression equation was set up, using the estimates from the mail survey as the independent variable (X) and the unbiased estimate as the dependent variable (Y). Estimates for the 14 counties without enumeration samples were derived from this formula by substituting the mail-sample estimates for "X."

In a few of the smaller counties the regression equation did not seem suitable because of the magnitude of the Y-intercept. That is, a negative Y-intercept resulted in a computed number of trees for the non-respondents so low that it looked unreasonable. In these counties a per orchard expansion, derived from the mailed returns, was used to estimate tree numbers for those orchards for which neither county agents nor inspection records could supply data. But in the major counties the regression estimate was accepted.

Our list of growers was incomplete for most counties in the northwest district and for some counties in the central west district. Tree numbers for the missing growers were obtained from data collected in connection with the 1948 cherry fruit-fly inspections. Comparing district totals for the two methods it was found that the latter were considerably larger in the northwest and central west districts. The two methods gave about the same results in the southwest district. The difference between the per orchard estimate and the ratio estimate in the northwest and central west districts was attributed to duplications in the list of operating units. The most tenable theory seemed to be that the duplication was approximately proportional to the product of the number of respondents to the mail survey in the county multiplied by the average number of trees per grower in the county.⁴ Consequently, we formulated the hypothesis that the remaining duplication of operating units would be proportional to the product of the number of non-respondents and the average number of trees per grower in the county.

An alternative hypothesis that the duplication was a linear function of the number of non-respondents seemed as good within districts. However, if several districts were to be taken together or if the State as a whole were to be considered, the first hypothesis seemed preferable and simpler. The magnitude of the duplication was made evident by comparing the total number of growers in the county with the number of orchards in the 1945 Census of Agriculture in the northwest district, where virtually all cherry orchards are commercial units. When this comparison was made it was found that in several counties the number of growers on our list was considerably in excess of the census number of orchards; in fact, the excess of grower names over the number of orchards in Grand Traverse County, as given by the census, supported the above hypothesis which was used to eliminate the duplications in the larger counties. A ratio estimate of sweet-cherry tree numbers could not be computed, as reliable pro-

⁴ A larger orchard is more likely to be duplicated than a small orchard since several operators or owners or both may be associated with the transactions of the orchard; also the larger the number of orchards in a county the larger the number of duplications.

TABLE 2.—*District and State data for all cherries, showing magnitude of adjustments applied to original regression estimates*

District and State	1 Regression estimate	2 Missing growers from insp. data	3 Per orchard estimate (1) + (2)	4 Indicated du- plication (Trees)	5 Duplication removed (Trees)	6 Final esti- mate (3) - (5)	7 1945 census All cherries
	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>
Northwest.....	1, 619	299	1, 918	331	¹ 326	1, 592	1, 360
Central West.....	733	162	896	105	¹ 96	800	699
Southwest.....	646	0	646	36	36	610	533
Remainder of State.....	58	0	58	0	² 4	54	211
State.....	3, 056	461	3, 518	472	462	3, 056	2, 803

¹ Duplication not removed in several counties because of suspected compensating bias in mail survey, that is, growers forgot to report sweet cherry trees; in several counties it was possible to remove duplication by direct comparison rather than according to the stated hypothesis.

² Column 5 was obtained by subtracting column 6 from column 3. The regression method was not used as the basis for obtaining column 6 (final estimate) for these counties because of unreasonable results in some counties, that is, a negative number of trees in some counties or mail returns of 1 or 2 reports representing extremely large orchards.

duction figures by district were not available; a per orchard estimate was used with the following adjustment for duplication: (1) For each county the number of orchards duplicated in the lists was estimated by dividing the number of sour-cherry trees duplicated by the average number of sour-cherry trees per orchard indicated by the regression method; (2) the number of duplicated sweet-cherry trees was obtained by multiplying the number of orchards found in (1) by the average number of sweet-cherry trees per orchard in the respective counties.

After county estimates were obtained for sour and sweets by the methods outlined above, comparisons were made with 1940 and 1945 census data. Census data by counties seemed to agree reasonably well with the county estimates of total tree numbers, hence the county and district estimates were left unchanged to minimize the use of judgment in deriving final estimates. Judgment estimates were made in only a few counties, but more of such estimates would have been necessary if it had not been for the cooperation of the processors visited, and the availability of inspection data. A summary by districts of the statistics entering into the final estimates is shown in table 2.

Sampling Errors

Sampling errors for the age groups were computed for several counties. At the 5-percent level, or two standard errors, these sampling errors had a range for individual counties from about 10 to 100 percent and averaged about 40 percent; for

crop-reporting districts the range was from 10 to 80 percent and averaged about 30 percent; and for the State as a whole the range was from 10 to 30 percent and averaged about 20 percent. For the break-down into only bearing trees and non-bearing trees the sampling errors averaged about 30 percent by counties, 20 percent by districts, and 10 percent for the State.

Remarks

Experience in this survey leads to suggestions that may benefit others who may contemplate similar surveys. They apply to list sampling of the type undertaken in this survey, though they may be of value in other situations. The list of growers was supplied by a State agency which had compiled it from several sources. After it was submitted to county agents, district horticultural agents, and others for review, a practically complete list was obtained. Nevertheless, some omissions and duplications were still present. A combined pre-test of the mailing list and the schedule might be made about as follows:

(1) Select area segments in several counties to test the mailing list for completeness, duplications, and qualifying criteria.

(2) Take a schedule at every 10th farm (or every 5th farm).

Such a scheme would seem desirable if estimates for counties or districts are to be made. Other members of the operator's family or a neighbor could probably give the general infor-

mation required. In some States this kind of checking could be done rapidly by telephone from the county agent's office where township maps are generally available; only those farms from which a schedule was to be obtained would have to be visited personally.

Interviewing alternates at the same time the sample farms were visited, before it was known whether they would be needed, saved many miles of back-tracking, and speeded the interviewing.

The sampling of fruit orchards has shown that orchards vary considerably in size and are frequently fairly scattered. To reduce the costs of travel without sacrificing accuracy the use of the post office or a "postal unit" appears to be desirable. In this survey, after the counties were selected with probability proportional to the number of non-respondents, the interviews were clustered into groups of five farms each by post office or pseudo-post office addresses. Upon selecting names at random for each county, the next four names, following alphabetically in the same

post office list, were used to make up clusters of farms. No effects of this clustering could be detected in the mean squares.

The sampling errors of estimates for even very broad categories are rather large for crop-reporting districts and counties. For State totals, the break-down into a large number of age groups as in this survey is likewise subject to rather large sampling errors. We apparently must conclude that if we seek a break-down by a number of varieties or age groups, the results at even the State level will be subject to fairly large sampling errors for the per orchard expansion—say as large as 20 percent. But for broad categories, as total trees, both bearing and non-bearing, the sampling errors for a per orchard expansion can probably be kept within acceptable limits, that is, a 10-percent error at the 5-percent level. If acceptable district estimates are to be obtained, a control factor appears to be necessary. In this survey, the production of sour cherries proved to be a fairly efficient control factor.

Mimeographed indexes for volumes 1 and 2
are now available upon request.

Book Reviews

Income, Saving and the Theory of Consumer Behavior. By JAMES S. DUESENBERY. Harvard University Press, Cambridge, Mass. 128 pages. 1949. (Harvard Econ. Studies, Vol. 87.)

THERE CAN BE NO DOUBT that formal demand, or consumption, theory is in need of the kind of overhauling represented by this book. In recent years, production theory has become increasingly satisfying, not only in its structure but also in its contribution to practical, daily problems. But demand theory has not been so blessed with the same progress probably because of the complexity of man as a consumer. This is Professor Duesenberry's focus in this book.

Recognizing that ". . . we have to face up to the problems of the psychological bases of consumer choice," the book evaluates the consequences for income, saving, and consumer behavior theory. It first discusses the empirical basis of the theory of consumers' choice. Next is a reformulation of the theory of saving which is necessitated by recognizing the psychological bases of consumers' choice. The remainder of the book is devoted to testing the validity of such a reformulation.

To keep from being bogged down, the author does not attempt to create an analytical scheme which will explain in detail every purchase by every individual. He is ". . . primarily concerned with the central tendencies of the relations between economic variables and consumer choices."

This central tendency in our society revolves around one of our principal social goals—a higher standard of living. The author formulates this goal in comparative terms with emulation considered as being of great importance. "Once a group of high income people are recognized as a group of superior status, their consumption standard itself becomes one of the criteria for judging success." So that, ". . . it seems quite possible that after some minimum income is reached, the frequency and strength of impulses to increase expenditures for one individual depend entirely on the ratio of his expenditures to the expenditures of those with whom he associates". It is, thus, necessary to discard the implicit assumptions of consumption theory which says that individual consumer choice is independent of the choices of

other consumers. At the same time, that element in the choice of the consumer which is guided by the wish to be judged successful on the basis of one's comparative status denies the reversibility of the consumer's choice. That is, he does not consider himself in a position to curtail his consumption merely because of a rise in price or a fall in income. This general statement is familiar to readers of Veblen's works.

The author concludes, as a result of this situation, that the rate of saving for the whole economy is not dependent upon the level of income existing in the economy. The propensity of an individual to save depends upon his position in the income distribution of the economy. As his income increases in relation to that of other individuals there will be a tendency for his savings to increase. The rate at which his savings will increase will depend on where he is in the income distribution and how the income is distributed at that particular time. Also the rate of saving will change if the shape of the income distribution changes.

At the same time saving (and consumption, since savings plus consumption equals income) is affected by changes in income over time. The author concludes that it is the relation of current income to the previous peak which regulates the rate of saving over the business cycle.

Of course, the rate of savings is also affected by other things, for example, interest rates, income expectations, the rate of growth of income and the age distribution of the population. But the author concludes, "On balance, changes in these variables have not been sufficiently large to have had much effect on the savings ratio."

In conclusion, it is gratifying to see someone trying to work these ideas into formal consumption theory. It is hoped that not only Professor Duesenberry but also other economists will continue to work in this area. Revisions in formal consumption theory are long overdue.

Howard L. Parsons

HERE IS A BOOK that has been needed for many years by research workers in all fields, and particularly in the biological fields. Its title well suggests its contents; it should be clearly distinguished from those books in the wider fields of statistical methods and design of experiments. To draw the contrast in another way, this book places major emphasis on providing a checklist of designs of proven merit rather than a checklist of the principles or features of a good experimental design as covered in statistical textbooks and manuals. The book is unique in this field.

The authors assume that the reader has some knowledge of the principles of analysis of variance and of the computational methods involved as well as some familiarity with the logic of experimentation. However, they devote the greater part of the first two chapters to this third subject. The book is replete with examples of computational methods, both symbolic and numerical, showing the computational procedures, step by step, so that the reader who has had little practice will not feel handicapped.

In the chapter "Notes on the Statistical Analysis of the Results," the authors provide, in condensed form, the mathematical justification of the analysis of variance and covariance and the estimation of missing data. In this chapter, the mathematical model is defined, and the assumptions made in the model are stated for the simple case of the randomized block design. In later chapters, where the designs are more complex, mathematical justification is provided by reference to and extension of the theory developed in this chapter. In each case, the authors first construct the mathematical model involving a linear relationship among the parameters. This is followed by the equations of estimation obtained by the method of least squares. Of particular help to readers who may not have access to statisticians, a set of rules is supplied for making comparisons between treatments and treatment groups and for calculating the standard errors of these comparisons.

Two-thirds of the book is devoted to a listing and discussion of specific experimental designs. Following a chapter on randomized blocks, latin squares, and graeco-latin squares, the authors em-

bark upon a comprehensive discussion of factorial experiments and experiments involving a large number of treatments or varieties. Throughout this discussion, as nearly as the design permits, a uniform pattern of presentation of the material is followed. Each new major design variant is introduced by a description and discussion of its general properties. Following this is a section on the relationship of this to other designs. Next, when pertinent, are sections on arrangement of the material and randomization. Then come sections on statistical analysis with numerical examples and formulas for calculating the errors of treatment comparisons. Generally, formulas are provided for estimating missing data, and for estimating the efficiency of the design.

A highly valuable feature is the section on plans at the close of each chapter. These are supplemented where needed by text sections of notes on the plans and their statistical analysis. At the close of chapter 11, for example, are an index and plans for 46 balanced incomplete block experiments. At the close of each chapter and of the book is a bibliography listing the technical statistical literature in which the mathematical techniques are available, as well as selected papers reporting results of experiments in which the designs have been used successfully. The authors have rendered an invaluable service to research workers and students of statistical methods in bringing together under one cover the results of statistical methods research previously available only in the widely scattered statistical and technical journals in which they were originally published.

It is unusual to find a statistical textbook or reference book which does not include the standard tables of the normal, "F," and "t" distributions for use in making tests of significance and setting confidence limits. This omission, among others, seems to bear out an intention on the part of the authors that this is not a complete textbook or reference but is designed to be used by workers with substantial training and to be supplemented by standard textbooks and books of tables such as those of Fisher and Yates.

James G. Osborne

FRIENDS and associates of Dr. Deming and other research workers have awaited the publication of this book with some impatience for a number of years. The delay is by no means a net loss, for the author includes new materials and results of experience of very recent date. This work may well prove to be the definitive treatise in the field of statistical sampling theory, particularly as it relates to sampling surveys. The author at a comparatively early age deserves to be recognized as the dean of scientific statisticians in the Federal service, where he has initiated, participated in, and accelerated many of the advances in the science.

Some Theory of Sampling is both a reference work and a classroom text, with sufficient clarity and detail to serve for self-instruction as well. Although the author states that college algebra is usually sufficient but "occasionally some forgotten calculus may need refreshment," this reviewer is convinced that a good grounding in calculus is needed for complete assimilation of the sections dealing with sampling theory. It is true that only a fraction of the more advanced sections make this requirement, and the remainder of the portions on theory do not pass beyond college algebra, particularly those dealing with actual survey experiences, survey planning, and the extended discussion of errors and biases. Other sections, and some entire chapters, do not require mathematical proficiency of any description.

A wealth of exercise and illustrative material supplements the text; most of this appears to be drawn from the extensive classroom and practical experience of the author. The exercises are carefully organized and graded and are designed to cement and extend the theorems developed in the text and to bring out lesser known but important properties of statistical functions and distributions.

Fellow workers know well, and sometimes to their chagrin, the passion for consistency, thoroughness, and rigor, that so particularly characterizes the research and writings of Dr.

Deming. His students have had opportunity to benefit from his talents for organization and integration of materials into a logically connected sequence which leads comfortably from elementary principles to advance theory and applications. Both features are found in this book. Complete derivations and proofs are provided for important theorems and formulas. The author obviously does not believe in propounding statistical mysteries nor in requiring the reader to accept propositions on faith.

The main purpose to which this work is addressed is to develop understanding and proficiency in methods for evaluating sampling precision of averages, totals, and other statistical estimates, for each of a wide variety of sampling and survey procedures, and thus to provide the basis for selection of the most efficient procedure under limiting conditions which must be met in each application. Sections on the Gamma and Beta functions, treating their mathematical properties and statistical applications, are probably unmatched in any other writings in the field. Other statistical functions, treated in original fashion and with unusual detail, include the point binomial and the hypergeometric series. Theory and method for acceptance sampling and quality control are carefully developed with special reference to the pioneer work of W. A. Shewhart and the recent development of sequential sampling is included.

The reader may occasionally wish for a clearer demarcation of end products, in the shape of formulas for direct application, from their preceding derivations. Notations sometimes appear cumbersome, but in most cases this probably is necessary, for further simplification would cause slight inaccuracies. Schemes for analysis of variance and their related experimental and sampling designs are not elaborated here. It is refreshing to find a modern author who recognizes that all of the foundations of theoretical statistics do not date from 1912.

Richard O. Been

THIS LONG-AWAITED summarization of the findings of the Southwestern Land Tenure Research Project, is a welcome contribution to the literature of agricultural economics, rural sociology, and regional research organizations and methodology. The study deals with socio-economic problems of the region (Arkansas, Louisiana, Mississippi, Oklahoma, and Texas) but it warrants consideration by social scientists both outside and within the region. It is a valuable reference for certain courses in farm management, rural sociology, land economics, and agricultural policy.

The purpose was "to determine and measure the relationships between the tenure status of the farm family and its economic and social performance." Readers are cautioned early not to expect an evaluation of these relationships, in terms of policy implications or methodological conclusions. These aspects are occupying separate reports.

After a general chapter on the regional tenure situation and problems, there are chapters by regional staff members on tenure and farm organization, tenure and family status, factors related to changes in tenure status, leasing arrangements and landlord-tenant relations, land tenure and soil conservation, legal aspects of land tenure and farm credit, use and sources of capital, impact of federal programs on tenure, and community and institutional factors in tenure—a rather comprehensive study of the rural economy of the region.

Aside from some of the usual tenure-linked factors—size of farm, age of operator, mobility—the study raises considerable doubt of the influences of tenure upon major components of farm family well-being but scale of operations appears to be influential.

As contributions of several kinds of subject-matter specialists are brought together, some repetitions and conflicts result. As an example, one contributor finds "Land use and crop organization on the farms studied showed little variation between operators of different tenure"; another concludes "From the standpoint of major land use and type of farming, there is almost always some degree of difference between owners and tenants in a given area." Thus, readers are left without definite conclusion on an important part of the study.

This reviewer would favor having policy and

methodological conclusions in this volume, as direct and logical outgrowths of the analysis. Until the findings are interpreted in terms of problem solving, it is difficult to appraise the significance of what the relationships may mean. Where attempts were made to push the analysis into the arena of improvement of action, serious questions may be raised about some of the deductions. For example, in the analysis of impact of Federal programs upon tenure, it is concluded that little progress was made in the less efficient sectors of the economy—the sick areas most in need of adjustment. After this analysis, it is a surprise to find proposed as an alternative to the present agricultural programs, a general program "which would provide for a level of minimum conditions for those engaged in farming. . . ." Apparently, the fundamental problems of misallocation of resources, inefficiencies of production, and high population-resource relationships, are not brought into the adjustment process.

High points center around the tenure classification, management index, capital accumulation processes, and appreciation of environmental factors within which rural problems exist and within which solutions must be worked out.

This study differs from most rural social science regional projects in that (1) it was conducted on a regional cooperative basis implemented by regional workers' conferences and a regional staff, (2) subject matter and methods were kept relatively uniform throughout the five-State region although there was considerable autonomy within each State, and (3) research specialists from rural sociology, law, farm management, and land economics, worked together on the many facets of the problems.

In addition to this and two forthcoming reports on policy and research, 38 reports have been or are being published by the cooperating States. The project was carried out under grants of funds from the General Education Board and the Farm Foundation.

Harold Hoffsommer, director of the project and editor of this volume, and the staff of cooperators deserve congratulations on bringing the project to successful completion, in light of the trying war years during which much of the work was done.

John F. Timmons

OBVIOUSLY DESIGNED as a textbook for vocational agriculture classes in high school, this book would also be excellent for young farmers getting started in farming if there were some effective means of having this kind of publication read by such individuals who need it.

The book has two almost equal parts. The first deals with the principles of sound farm financing and the second is essentially a discussion of the sources of agricultural credit and a description of agricultural credit institutions.

The first half has a useful admixture of farm management and farm finance. On the whole, it is the better done of the two. It deals with capital requirements, leasing, transferring the farm from father to son, appraisal, terms of loans, risks of using credit, and related questions. The authors evidently want to show young farmers how to make credit a successful tool instead of a financial handicap. They point out many of the pitfalls in agricultural finance that contributed to the financial ruin of a generation of farmers between the two wars. They probably overemphasize that the smart farmer did not go in debt unduly during periods of high prices, but bought his farm during lower prices. Where long-term indebtedness is involved it is always better to buy a fixed capital asset during low prices, but as a practical matter this would mean that a generation of young farmers might have to forego the purchase of farms. A young farmer cannot "forestall middle age" more than a few years while waiting for the business cycle to change. There is a growing body of opinion that the time for a young man to buy a farm or a home is when he is financially ready; then he can use this asset during his productive years. He might want to vary the terms of finance, percentage of equity, and method of repayment, depending upon the stage of the business cycle in which he buys.

The second part, dealing with agricultural credit institutions, is more descriptive than analytical. One has the impression that the chapters dealing with federal and quasi-federal lending agencies have been adapted largely from bulletins and press releases of the agencies themselves. This reviewer found himself wishing that the authors, so broadly experienced in farm finance,

had been more analytical, and at points even critical, of the operation of the Farm Credit Administration units.

Though the authors were obviously trying to be fair in their treatment of private lending agencies, the book points to limitations in the ability of private agencies to finance agriculture without calling attention to what may be equally dark spots in the history of the federal lending agencies. In places there is an undertone that the federal agencies have been the farmer's guardian, or even savior, against the selfish practices of private agencies. For example, while discussing sources of agricultural credit, the authors state "a farmer should avoid borrowing money from a lender who is in business for the purpose of making a profit at the borrower's expense by exercising his foreclosure rights at the slightest deviation from the terms of the contract." Then while discussing the big volume of federal land bank refinancing from 1933 through 1935, they say that 85 percent of the 2 billion dollars loaned by the land banks and commissioner was used by the borrowing farmers to pay outstanding debts and thereby avoid foreclosure. Few students of agricultural finance would let go unchallenged the inference that all of those farmers refinanced to avoid foreclosure. No mention is made of the foreclosure record of the federal land banks during the early 1930's. In some sections where these banks were the principal land owner in entire townships if not counties, some farmers may still be reluctant to classify them as the farmers' friend while leaving commercial banks and insurance companies outside the veil.

Again, while discussing commercial banks, the authors say, "Although banks have certain rights and privileges that permit them to operate at a profit, they are also subject to certain controls and restrictions imposed by law for the protection of their customers." This reviewer is not aware that there is anything wrong with operating at a profit. The authors do not discuss the regulating influence of competition among private lending agencies in the farm lending field. We read that "the operations of the farm credit institutions have been an important influence in reducing interest rates to farmers" and when the loans made by production

credit associations are discussed: "These developments have resulted in a generally improved credit service and saving of interest costs to farmers." No doubt the federal credit agencies had some influence in hastening the reduction of interest rates, but nearly every student of farm finance agrees that the rates would have lowered themselves during the last 15 years, without federal agencies in

the field, because of a cheapening of money rates and sheer competition among lenders.

In spite of these points of criticism the book is a valuable contribution in the vocational education field. It is well written, reads smoothly, and contains a great deal of worthwhile information which will be useful to the beginning student.

Earl L. Butz

Selected Recent Research Publications in Agricultural Economics Issued by the Bureau of Agricultural Economics and Cooperatively by the State Colleges¹

BRODELL, ALBERT P., and CARPENTER, CHARLES G. HARVESTING HAY AND SILAGE. U. S. Bur. Agr. Econ., F. M. 79, 18 pp. June 1950.

Estimates, by States, the form in which 1948 hay crop was fed or sold, and extent of use of field forage harvesters and stationary cutters for harvesting different kinds of silage.

CHURCH, DONALD E. EFFECT OF INCREASES IN FREIGHT RATES ON AGRICULTURAL PRODUCTS. U. S. Dept. Agr. Cir. 847, 39 pp., illus. April 1950. (RMA.) [Printed.]

Shows that an increase in transportation costs by a uniform percentage tends to decrease prices at nearby markets and to increase them at distant markets.

COOK, HUGH L., and HUSSEMAN, DOROTHY L. CONSUMER ACCEPTANCE OF DRY MILKS IN QUANTITY COOKERY. Wis. Expt. Sta. Res. Bul. 164, 32 pp., illus. Madison. January 1950. (BAE cooperating; RMA.) [Printed.]

Shows that the use of dry whole milk or nonfat dry milk solids, in certain dishes, increased their milk solids content without significantly decreasing the preference for the dishes.

CROWE, GRADY B. MECHANICAL COTTON PICKER OPERATION IN THE YAZOO-MISSISSIPPI DELTA. Miss. Agr. Expt. Sta. Bul. 465, 20 pp. State College. July 1949. (RMA report.) [Printed.]

Informs as to costs and performance of one-row spindle-type, mechanical cotton harvesters under farm conditions; their operating efficiency compared with hand labor; and costs of machine and hand picking.

FOLSOM, JOSIAH C. WAGE CEILING IN FLORIDA CITRUS GROVES, SEASON OF 1934-44. 12 pp. Bur. Agr. Econ. July 1950.

Control of wage rates was reasonably satisfactory, despite limited adjustment services and publicity. Pickers for the larger packinghouses averaged \$30 a week; those for smaller houses, \$25 or less.

FOOTE, R. J., and SCHOLL, J. C., under the direction of L. H. BEAN and C. E. BURKHEAD. ANALYSIS OF CROP-WEATHER RELATIONSHIPS (PROGRESS REPORT.) Bur. Agr. Econ. 22 pp., illus. June 1950. (RMA.)

Discusses certain aspects of research now done or in progress on a study of the year-to-year changes in market supplies due to changes in yields per acre. Illustrates the methods to be used in presenting crop and weather data.

FUQUA, ORVILLE. FARM REAL ESTATE ACTIVITY IN TWELVE WESTERN COUNTIES, 1941-48. 53 pp., illus. Bur. Agr. Econ. June 1950.

Outlines voluntary transfers in the 12 counties, and break-down by individual counties.

GAINES, JAMES P., and CROWE, GRADY B. WORK-STOCK VS. TRACTORS IN THE YAZOO-MISSISSIPPI DELTA. Miss. Agr. Expt. Sta. Bul. 470, 10 pp. March 1950. (RMA, BAE cooperating.) [Printed.]

Shows that large tractors are cheapest source of power on farms with 60 acres or more in crops; and that medium-sized tractors can replace economically at least three mules on cotton farms with 30 to 60 acres of cropland.

HAY, DONALD G., and JOHN, M. E. RURAL ORGANIZATION OF BRADFORD COUNTY, PENNSYLVANIA. Pa. Agr. Expt. Sta. Bul. 524, 38 pp., illus. State College. April 1950. (BAE cooperating.) [Printed.]

Representative types of rural organizations in the north-eastern general farming belt are found here. The report shows that greater emphasis is needed on membership relations, on program planning, and on coordination of activities.

HOLMAAS, ARTHUR J. AGRICULTURAL WAGE STABILIZATION IN WORLD WAR II. U. S. Dept. Agr. Agr. Monog. 1, 140 pp. 1950. [Printed.]

One of the war records monographs which present the history of the Government's activities in World War II.

¹ Printed reports are indicated as such. All others are processed. State publications may be obtained from the issuing agencies of the respective States.

LAGRONE, WILLIAM F. COTTON GROWING IN SOUTH-WESTERN OKLAHOMA; A COMPARISON OF PRESENT METHODS AND RECOMMENDED PRACTICES. Okla. Agr. Expt. Sta. Bul. B-350, 35 pp., illus. June 1950. (BAE cooperating.) [Printed.]

These cotton farmers follow good systems of production in several specified respects, but improvements are needed in respect to insect control, fertilization, kind of tillage, and contour planting, listing, and chiseling.

LANHAM, BEN T., JR. COMMERCIAL REACTIONS TO ALAMALT—A FULLY-COOKED SWEETPOTATO FLOUR. Ala. Agr. Expt. Sta. Prog. Rept. Ser. 46, 24 pp. Auburn. June 1950. (RMA, BAE cooperating.)

CONSUMER REACTIONS TO "ALAYAM" BREAKFAST FOOD. A NATION-WIDE ACCEPTANCE TEST OF A NEW TYPE OF BREAKFAST FOOD MADE OF SWEETPOTATOES. Ala. Agr. Expt. Sta. Bul. 273, 82 pp. Auburn. June 1950. (RMA, BAE cooperating.) [Printed.]

CONSUMER REACTIONS TO "ALAYAM" CANDY. A NATION-WIDE ACCEPTANCE TEST OF A NEW TYPE COCOANUT BRITTLE MADE OF SWEETPOTATOES. Ala. Agr. Expt. Sta. Bul. 271, 61 pp., illus. May 1950. (RMA, BAE cooperating.) [Printed.]

CONSUMER REACTIONS TO ALAYAM "SNACKS." A NATION-WIDE ACCEPTANCE TEST OF A NEW TYPE OF "SNACK" PRODUCT MADE OF SWEETPOTATOES. Ala. Agr. Expt. Sta. Bul. 272, 82 pp. Auburn. June 1950. (RMA, BAE cooperating.) [Printed.]

Nation-wide acceptance tests for these new products were made and are here reported.

MALPHRUS, LEWIS D., and CONLOGUE, ROBERT M. PHYSICAL LOSSES, MARKETING COSTS AND PRICES OF FRESH TOMATOES (BASED ON SHIPMENTS FROM SOUTH CAROLINA AND OTHER POINTS TO JACKSONVILLE, FLORIDA). S. C. Agr. Expt. Sta. Bul. 383, 32 pp., illus. Clemson. May 1950. (RMA, BAE cooperating.) [Printed.]

Approximately 43 percent of the South Carolina tomatoes observed were lost through deterioration in quality between the time of harvest and time they were retailed in Jacksonville, Fla.

PARSONS, M. S., FRICK, G. E., PULLEN, W. E., and BREDO, WILLIAM. THE SEASONAL ADJUSTMENT OF MILK PRODUCTION IN THE BOSTON MILKSHED. 57 pp., illus. Bur. Agr. Econ.; The Me., N. H., and Vt. Agr. Expt. Stas.; and the Admin. of Fed. Milk Mktg. Order No. 4. Washington, D. C. June 1950.

Further reducing the seasonality is not likely to reduce materially the costs of assembling, receiving, and transporting fluid milk. Substantial reduction from the seasonal production pattern of 1947-49 would tend to raise production costs and would raise prices to consumers.

PUBOLS, BEN H. CITRUS FRUIT DURING WORLD WAR II. U. S. Dept. Agr. Agr. Monog. 3, 77 pp., illus. June 1950. [Printed.]

Equitable distribution and pricing of citrus fruit became a major problem. Special programs, regulations, and actions, which conditioned the wartime behavior of the citrus economy, were instituted. These programs are described.

SITLER, HARRY G., and BURDICK, R. T. THE ECONOMICS OF SUGAR BEET MECHANIZATION. Colo. Agr. Expt. Sta. Bul. 411-A, 56 pp., illus. April 1950. (RMA; Colo. Agr. Ext. Serv. and BAE cooperating.) [Printed.]

In 1947 and 1948, on the farms studied, it cost \$1.03 to mechanically harvest and load 1 ton of sugar beets into trucks, as opposed to \$1.93, the cost of harvesting 1 ton by hand-topping and mechanical loading.

STEANSON, OSCAR, and DAVIS, JOE F. ELECTRICITY ON FARMS IN THE UPPER PIEDMONT OF GEORGIA. Ga. Expt. Sta. Bul. 263, 62 pp., illus. Experiment. June 1950. (RMA, BAE cooperating.) [Printed.]

This study is directed primarily toward the development of comprehensive information (1) that will be useful in estimating the probable future use of electricity on farms; and (2) that would indicate the types of electrical equipment now being used on farms of various types and sizes.

UNITED STATES BUREAU OF AGRICULTURAL ECONOMICS. MARKETING MARGINS ON ONE SHIPMENT OF WISCONSIN EGGS TO AN EASTERN CITY OCTOBER-NOVEMBER 1948. 12 pp., illus. Washington, D. C. June 1950. (RMA)

Shows that the average price spread was 22.9 cents between consumers and farmers, although margins differed for the different grades of eggs.

UTAH AGRICULTURAL EXPERIMENT STATION, COLORADO AGRICULTURAL EXPERIMENT STATION, and UNITED STATES DEPARTMENT OF AGRICULTURE. CONSUMER DEMAND FOR PEACHES OF VARYING STAGES OF MATURITY, 1949. Utah Agr. Expt. Sta. Bul. 339, 20 pp. Logan. June 1950. [Printed.]

Shows that under normal transit conditions, peaches advance about one stage of maturity between intermountain shipping points and midwestern markets.

VOELKER, STANLEY W., and HUNTER, ELMER C. VALUE OF WATER FOR IRRIGATION IN THE ROARING FORK BASIN OF COLORADO. 68 pp. Bur. Agr. Econ. and Colo. Agr. Expt. Sta. May 1950.

Presents several refinements of the income-to-land method for determining the value of water.

WALLRABENSTEIN, PAUL P., and MESICK, DAVID O. WAGES AND WAGE RATES OF HIRED FARM WORKERS, UNITED STATES AND REGIONS, APRIL AND SEPT. 1948. U. S. Bur. Agr. Econ. Rept. 22, Surveys of Wages and Wage Rates in Agriculture, 43 pp. Map. 1950.

Results obtained from interview sample surveys of farm wages and farm-wage rates. Gives hourly and weekly cash wages, and time worked.

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